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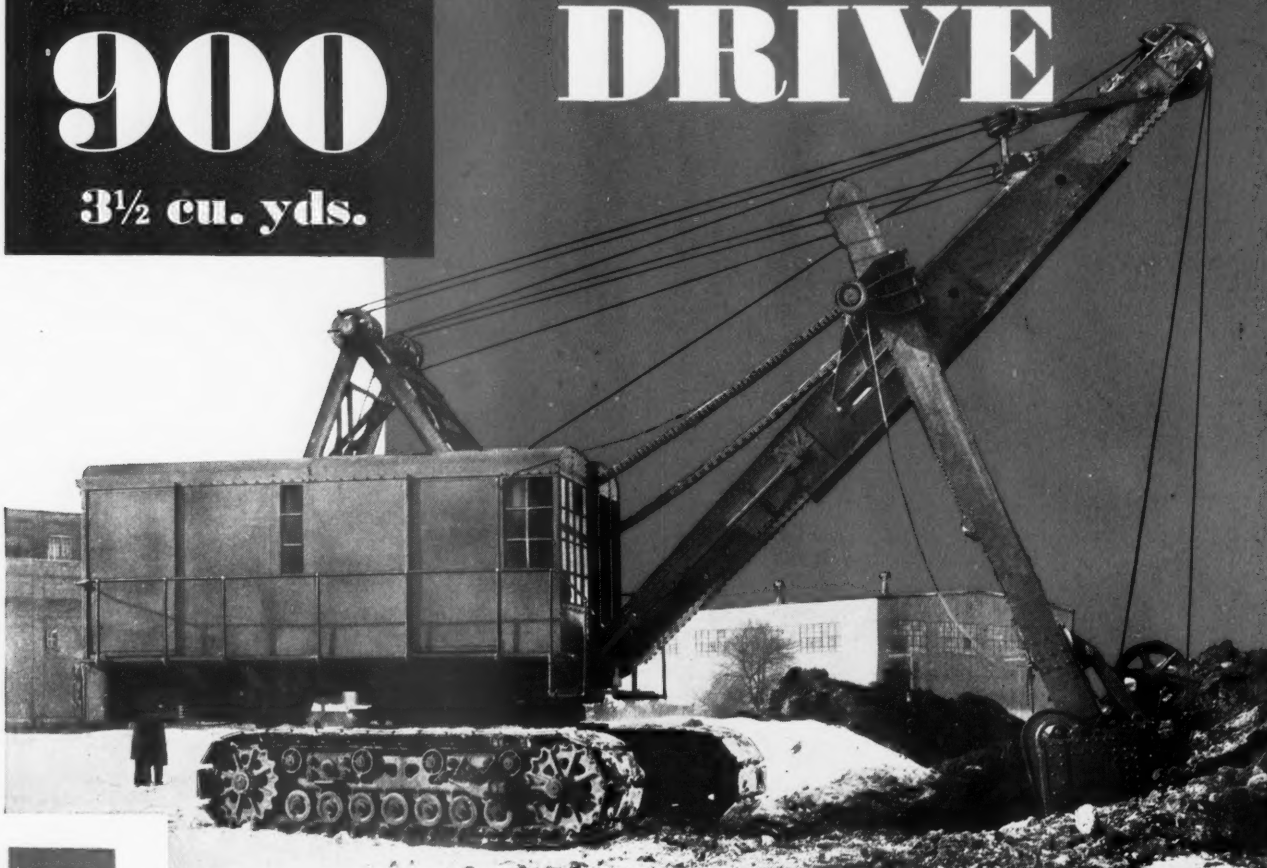

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All Moving Parts Protected From Abrasion at This Silica Plant

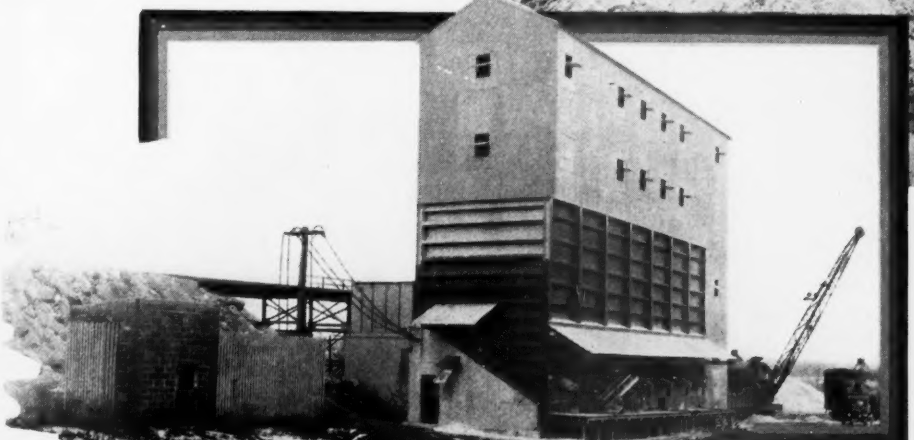
Application of Modern Methods Proves Effective at the New Columbia Silica Co. Operation Near Akron, Ohio

By A. K. West
Timken Roller Bearing Co., Canton, Ohio

THERE IS ONE FACTOR in the selection of equipment for silica plants requiring special consideration; namely, the necessity of protecting moving parts from the highly abrasive silica dust. From this standpoint as well as in other features the new plant of the Columbia Silica Co., which is located near Akron, Ohio, is of considerable interest as an example of the application of modern methods and equipment. The arrangement is such that material is moved through the various processes rapidly, and with a minimum of rehandling. Also the protective measures adopted, while compartively simple, have proved perfectly effective.

The plant produces two general classes of material, wet and dry, suitable for a number of different purposes, such as sand blast in all sizes, core sand, traction sand, setting sand, filter gravel, and others. The capacity of the plant is 1,000 tons per day of 10 hours. Both varieties of material are produced in a wide range of sizes, the washed in five sizes ranging from 1¼ in. to 28-mesh, and two grades of sand below 28-mesh, and the dry in seven sizes, from ¼ in. to 28-mesh. The dust from the dry mill is also collected in bins to be marketed for various purposes. The plant is provided with facilities for shipment by either rail or truck.

The quarry immediately after a blast



General view of the plant showing the loading platform. The transformer substation is at the left

Silica Deposit

The raw material comes from a quarry on the company's holdings, which consist of a plot 55 acres in extent located on the road between Akron and Copley, Ohio. The deposit consists of a solid mass of quartz pebbles, in sizes up to 1¼ in., cemented into a brittle conglomerate by quartz sand. The silica content

of the whole mass is high, being actually 98.85%. The deposit is 40 ft. deep, and rests on a sandstone stratum that provides a solid foundation for trackage, or for steam shovels. The overburden is light, the greatest depth being about 1½ ft., alternating with large areas of outcrop.

The procedure followed in recovering the aggregate is substantially as follows: The overburden is stripped by means of scrapers, drawn by Fordson tractors. The next step consists in drilling a series of blast holes over the cleared area with a Sanderson Cyclone well-drilling outfit. The number of holes drilled for any one shot is naturally variable, but they are placed along seams whenever possible, to take advantage of natural cleavage planes in the deposit. After the shot, the larger blocks are re-drilled with a compressed air drill, the power being supplied by a gasoline engine-driven compressor mounted on a flat car. The blocks are then shot to break them into sizes suitable for dumping into the crusher hopper.

The aggregate is loaded into 5-yd., Western, side-dump cars by a ¾-yd., oil-burning, Marion steam shovel, and hauled to the plant, about a quarter of a mile away. The plant consists of a machinery building of structural steel and corrugated iron construction, which contains all the dry mill equipment, and a washing mill located out of doors at one end of the building. The building is divided into two sections, horizontally, the lower containing the primary crusher and disintegrator, the dryer, and the storage bins, and the upper the screening equipment. The wet mill consists of a series of rotary screens, mounted over concrete storage bins, all outdoors. There is also provision for a large stock storage pile, settling tanks, and waste disposal as well as trackage facilities for incoming and loaded freight cars.

Another view of the quarry, showing character of conglomerate aggregate

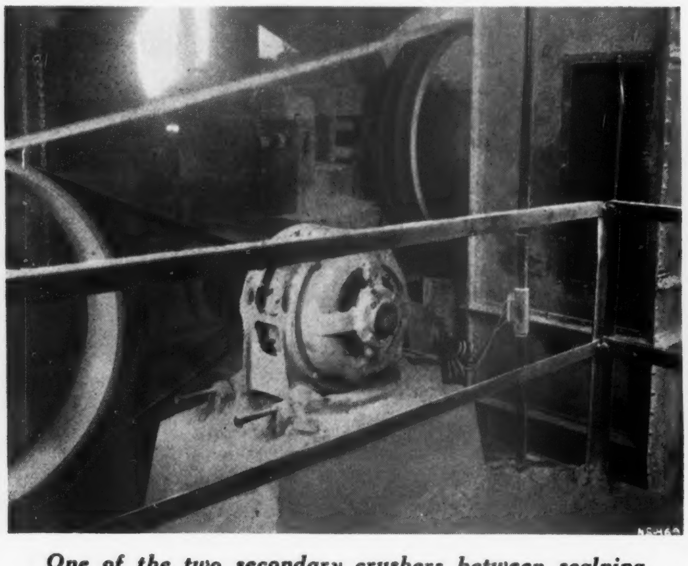
The plant forms a total connected load of 400 kw., power being supplied from a transformer substation located on the property. Power comes in at 6900 volts, and is stepped down to working voltage by a bank of three 6900/440 volt, 200-k.v.a., single-phase, Wagner transformers. The motor control is centralized at one point, and individual starting and stopping accomplished by push-button stations.

Scheme of Operation

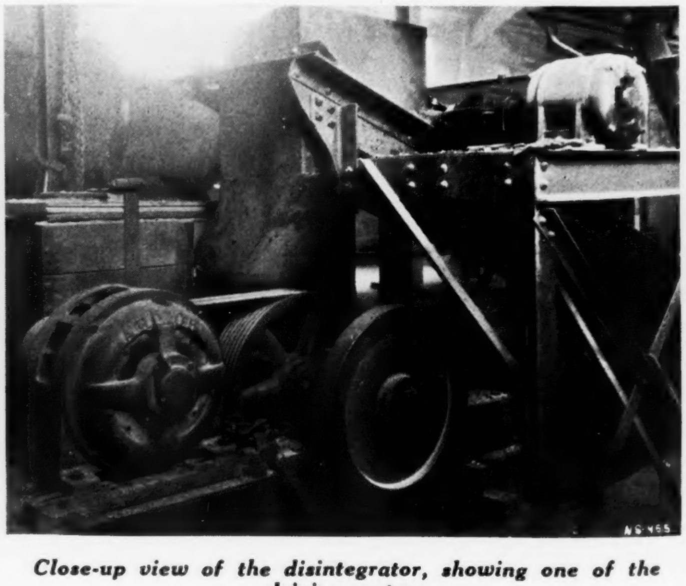
Before going into details concerning the equipment and its operation, an outline of the general procedure in force may be of interest. The operation of the quarry, and of the wet mill are necessarily seasonal; during the cold months they are both shut down. Therefore, in order to assure a steady supply of both washed and dry material on a yearly basis, the wet mill has been designed for a capacity nearly three times that of the dry mill. As a result, during the periods when the wet mill is operating, there is a daily accumulation of surplus washed material, which is stored either in bins, or in a storage pile. During the winter this reserve serves two purposes, it provides stock for the operation of the dry mill, and takes care of orders for washed material. Thus the dry mill can be kept on a uniform production schedule, throughout the year, without jeopardizing the supply of material available for outside consumption.

Processing

To resume concerning the operation of the plant, the aggregate from the quarry is dumped directly from the cars into the hopper of an Allis-Chalmers Fairmont roll crusher 24- x 60-in., driven by a double armature induction motor, with a total rating of 100 hp. From the crusher the material, broken down to 4-in. lumps, and less, falls on to a Stearns Timken-



One of the two secondary crushers between scalping screen and sorting screens



Close-up view of the disintegrator, showing one of the driving motors

equipped belt conveyor, 18 ft. between centers, that delivers it to the disintegrator. The belt conveyor is driven by a 2-hp. motor through a Falk reduction gear, and the disintegrator by two motors, one of 25- and the other of 35-hp., by Texrope drives. In the disintegrator the lumps of conglomerate are reduced to their primary constitutents of sand and gravel, in sizes from 1¼ in. down. The material, after disintegration, falls by gravity into the boot of a 60-ft. elevator, driven by a 10-hp. motor, which delivers it to the main flume of the washing mill.

The water is supplied by a 4-in. line, under 125-lb. pressure, from a 15-in., 165-ft. deep well located on the property. Actually, water from the well is pumped to a main reservoir by a Lane Ohio deep-well pump, driven by a 7½-hp. motor, and from the main reservoir to the flume by an Erie pump driven by a 60-hp., G.-E. slip-ring motor. After serving to carry the material through the wet plant, the overflow water is delivered to a tank where it is allowed to settle. From this tank it is pumped back to the main reservoir for further use. This system results in lightening the drain on the original water supply considerably, since only enough need be drawn to make up the losses from evaporation and entraining or leakage during the passage of the water through the mill.

Wet Mill

The wet mill itself consists of a bank of five Timken-equipped rotary screens, arranged in tandem, in a series of descending steps over as many concrete storage bins. The sides of the bins serve as piers for the support of the screens. The whole bank of screens is driven through a gear and countershaft train by a single 15-hp. motor. The first screen is a scalping screen, being double-jacketed, and serving to remove trash of various sorts that may have come through the crusher and disintegrator. The others are single-jacketed, and separate the material into four sizes, delivering it to the bins beneath. The sand and water from the last screen is delivered to a concrete basin equipped with a sand ejector that throws the heavy silt into a settling box. The sand from the settling box is put in storage bins, and the water goes to the main reservoir, as already explained. Surplus washed material destined for winter storage is handled by a 25-ton, 1-yd. locomotive crane with a 50-ft. boom, which loads it into a gondola for transportation to the pile.

Dry Mill

The operation of the dry mill is the same in season and out. Material, either from the wet mill storage bins in season, or from the stock storage pile in summer is loaded into a 75-ton hopper by the locomotive crane. The hopper is located out of doors, near the wet mill. From the hopper the material is fed to a Bonnot 5 x 50-ft., direct-heat dryer, driven by a 15-hp. motor by gravity. The waste heat and water vapor from the dryer is carried outside of the building by an exhaust fan, driven by a 25-hp. motor, discharging into a straight duct. The material, having come through the dryer, falls into the boot of a 51-ft. elevator, which delivers it to a 4 x 5-ft. Hum-mer scalping screen. Here the aggregate is given a preliminary separation, into 1¼ in., and undersize. The 1¼ in. and over from the scalper is delivered by gravity to two sets of crusher rolls, individually driven by 25-hp motors. The undersize goes to the screen bank for further sizing.

The oversize material, after having been crushed in the rolls, falls to an 18-ft. Stearns Timken-equipped belt conveyor that delivers it to the boot of the dryer elevator again. Here it mingles with the material from the dryer and is carried back to the scalper screen. The results of such a system are twofold; accumulations of oversize material that would require rehandling are eliminated, and the load on the sorting screens proper is lightened. Instead, the oversize material is automatically circulated until it is reduced to proper size, and only material of proper size ever gets to the sorting screens.

The material that passes the Hum-mer scalper, is delivered to a 36-ft. elevator, driven by a 2-hp. motor, which delivers it to a 36-ft. Stearns Timken-equipped belt conveyor, driven by a 2-hp. motor. This conveyor in turn delivers it to the sorting screen banks. The banks consist of six screens, in two groups, one of four and the other of two. In the first, three screens are in series, the oversize of each going over the next, and the oversize of the last going to a storage bin. The fines from the first screen, which is of closer mesh than the other three, go to a Stearns Timken-equipped 24-ft. belt conveyor, driven by a 2-hp. motor, which delivers them to the screens of the second group. These screens are arranged in tandem, so as to deliver into 3 bins. The fines from the second screen of the first group go to the fourth screen of the group, which delivers to two bins. Thus there is a total of seven separations, each going to an individual bin, four being made by one group of screens, and three by the

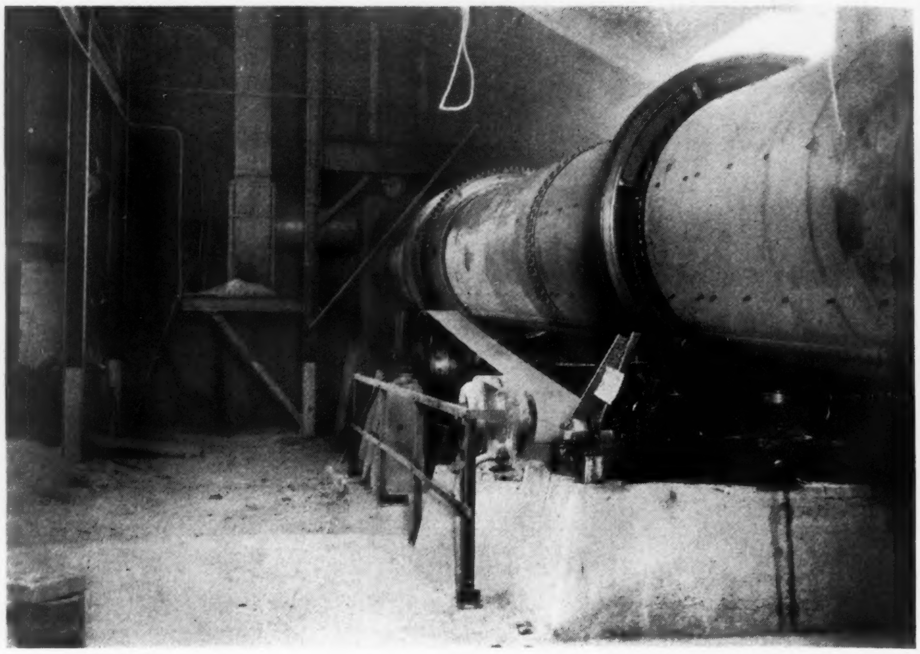
The five rotary screens with storage bins underneath, all driven from a single motor in the small house in center

other. All travel of material during screening is by gravity, except for the one belt conveyor mentioned.

Dust Protection

It is at this point that the dust-protective measures become operative, and hence their description is inserted here. What may be described as primary protection is furnished by a dust-collecting system, the main fan of which is driven by a 40-hp. Westinghouse motor. This system is arranged to collect dust over the entire plant. The dust being delivered to a common collecting cabinet, and from there conveyed to hoppers, from which it is loaded into bags for marketing.

Efficient as such a system is, there is bound to be a certain amount of leakage, enough at least to cause bearing and other trouble in the motors driving the plant equipment. A very little silica dust can ruin a motor bearing, or affect the windings very quickly, on account of its highly abrasive character. Therefore, as a further means of protecting continuity of service of the motors, and also to reduce maintenance cost, a Timken-equipped, totally enclosed, explosion-proof motor was standardized on for drive purposes. With these motors, there is no possibility of dust penetrating to the windings, or getting into the bearing chamber, no matter how bad the conditions may be. Also, the bearings permit the use of pressure grease lubrication, so that the possibility of dust getting into the bearings either in the lubricant, or during lubrication, is eliminated. As a consequence, motor maintenance expense, bearing or otherwise, has been conspicuously absent. An inspection, once a month, and a renewal of lubricant at infrequent periods is all the upkeep that has been necessary.

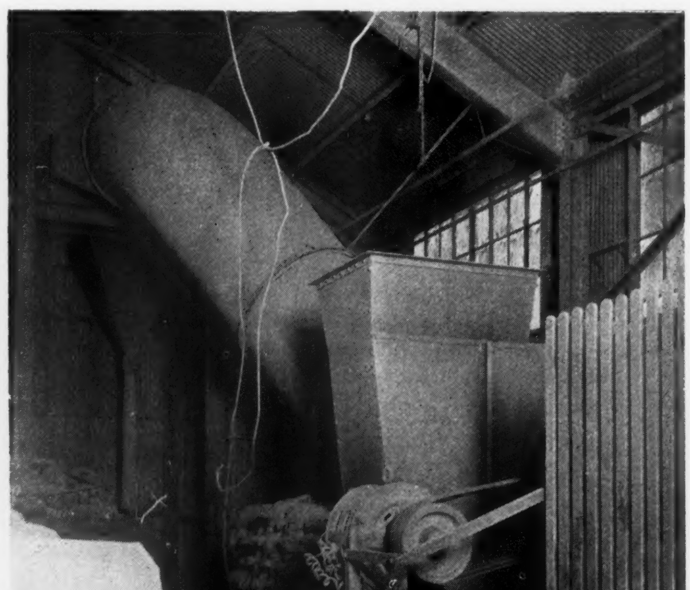


Dryer in machine building, with motor-driven exhaust system in background

Shipping Facilities

After having been sized, the material

View of battery of screens sorting the dry material in machine building



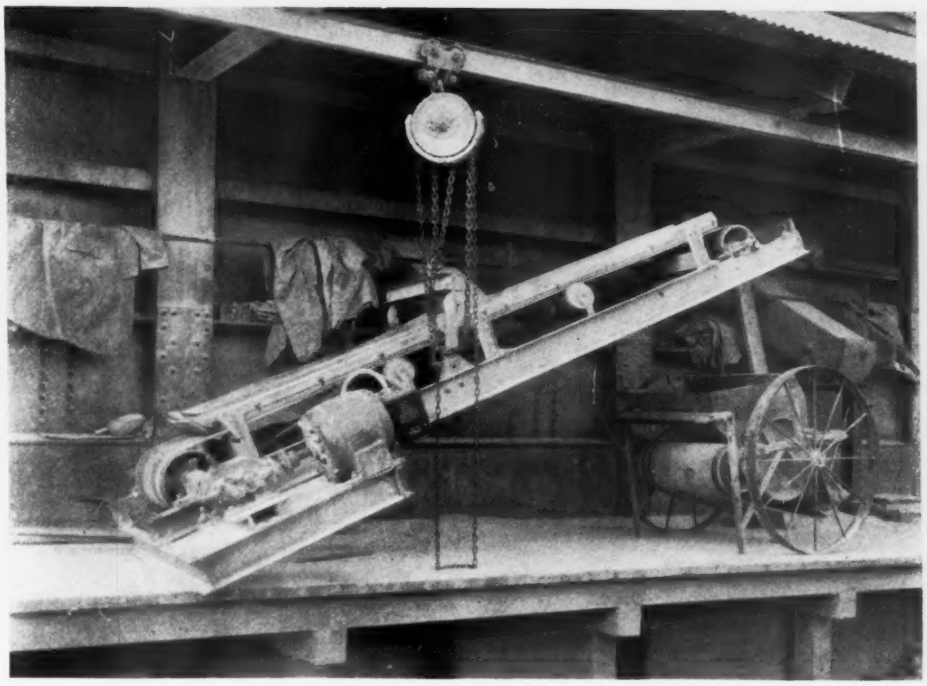
Dust collecting system. Bins in which collected dust is stored in background

goes to separate steel bins, each having a capacity of 300 tons. Provision has been made for both car and truck loading, by separate methods. The former consists of a 36-ft. Stearns Timken-equipped belt conveyor which runs under the bins, and projects outside the building. Trucks can be backed under this conveyor and loaded in a very short time. Cars to be loaded are brought up to a loading platform on the side of the building, over which are the bin spouts. Material from the bin falls to a portable 12-ft. belt conveyor, which with its driving motor is mounted as a unit on a steel frame. Material from the conveyor is dumped into a Sinden box car loader, which distributes in the car.

By means of this system it is possible to clean and load a car in thirty minutes. The company has its own 100-ton Strait track scale, which is located conveniently to the loading platform. As a further point of interest the incoming and outgoing tracks have been laid so that cars, both loaded and unloaded, are moved entirely by gravity while on the property.

Personnel

The president and treasurer of the Columbia Silica Co. is Pierce A. Snyder; the vice-president, general manager and sales manager, F. E. Holcomb; and T. S. Beaven is superintendent.



Portable conveyor and box car loader for loading material from dry storage bins into freight cars

Dust Collection

THE EXPERIENCE of the city of Flint, Mich., should be interesting to those in the rock products industry who have to meet a dust problem. The asphalt paving plant of the city had been built around until the dust was a serious annoyance to a number of householders. The first attempt to control the dust was a crude air washer, according to a paper by H. C. McClure, the city engineer, read at the Asphalt Conference held at West Baden Springs, Ind., in 1929.

The air-washing kept the dust down, but the dust was wasted. So an installation of collectors of the centrifugal type, made by the American Blower Co., was tried. The paper says that these collectors pick up 90% of the dust, the remainder being sent to the old air washer. The collectors are connected to the two 25-ton Warren dryers, the elevators, the mixer and other points where dust might originate. They discharge directly back into the sand elevator in just the same proportions that the dust enters, so that the hot sand grading is almost identical with that of the stockpile.

An average of 80 lb. a minute is reclaimed, according to the paper, equivalent to 20 tons per day on the present run. This at the regular price of $5 per ton, not including handling, amounts to $100 per day. The dust from the binder stone is handled the same way, although no saving is figured on the binder stone.

There is a further saving in this particular case from the fact that the dust is returned at 225 deg. F. A decided reduction in fuel consumption has been noted.

The collector fans are driven by variable speed motors and the operator has only to change the fan control a point or two to secure uniform heat and feeding. Automatic thermostatic control of the fan speed from the elevator temperatures is being worked out, and the paper says it appears to be entirely possible.

Coal Washing for Rock Products

COAL Washing Investigations is the title of Bulletin No. 300 of the U. S. Bureau of Mines, Department of Commerce. The authors are H. F. Yancey and Thomas Fraser. Naturally much of the bulletin is given to subjects outside of the rock products industry, but the description of the machines used and the methods of testing will be of the greatest interest to those who have to separate sand, gravel and other mineral products from lignite, coal, trash and other light materials.

Throughout the work the comparison is made with "sink and float" in heavy liquids, and the method of making these tests scientifically is given in detail. The use of such organic liquids as bromoform and carbon tetrachloride is recommended for the finer sizes in the place of the familiar zinc chloride solution. This part should be read by every operator who is trying to remove coal or lignite from his product and who wants a standard for comparison. Another testing method that should be useful to the sand and gravel operator is the use of a small hand jig which is simple to make and operate. It is described in detail.

The devices mentioned and described with more or less detail are the launder washer or rheolaveur, jigs, rising current classifiers, concentration tables and pneumatic tables and jigs, float and sink devices employing mixtures of sand and water, flotation, magnetic separation and electrostatic separation. All of these are employed somewhere in the rock products industry. Some of the particular machines, like the hydroseparator and hydrorotator, are becoming familiar, while others are familiar already. A somewhat novel device employing sand fluidized by air for floating off the coal is described.

Many tables and graph show the results of different operations, and it appears from these that it is sometimes possible to obtain satisfactory results by simple methods. One example of this is the work of a rheolaveur plant consisting of two simple washing troughs, which shows a 95% efficiency as compared with the sink and float test. An equivalent loss would be a cheap price for the sand and gravel operator to pay for freeing his product from coal or lignite.

Canadian Fuel Report

THE second progress report of the Dominion Fuel Board, 1923-1928, has been published in book form by the Canadian Department of Mines, Ottawa, Can. In this report the work of the board has been reviewed briefly, the present fuel situation stated and also the possibilities that are being opened up through technical investigation and research for more efficient and diversified uses of coal are given.

Portland Cement Industry on the Pacific Coast

Part I—Industry Marked by Many Promotional Activities in Spite of a Falling Market

By Walter B. Lenhart
Associate Editor, Rock Products

THE CONSUMPTION of portland cement for the three Pacific Coast states for 1928 is shown by a decrease in shipments of 700,000 bbl. from those of 1927; and for the year 1929 the United States Bureau of Mines estimates show a decrease in shipments compared with 1928 of 1,239,000 bbl.

In 1928, California had a rated capacity of 22,700,000 bbl. and Oregon with Washington, 6,259,000 bbl. with 59.3% and 63.3%, respectively, of the productive capacity utilized; yet there is no section of the United States that is so threatened with an avalanche of new plants as the Pacific Coast, particularly in that section from San Francisco southward.

Rumors of New Plants Fill the Air

Hardly a week passes without rumors that this company or that individual is considering building a new cement plant to supply some imaginary (mostly) future need for portland cement that will presumably be of such volume that present producers will be unable to supply the demand. That the public will be asked to purchase stock in these promotional schemes is a foregone conclusion in most cases. All this is in face of the facts that there is a serious over-capacity at present on the Pacific Coast, and that any increase in consumption can be met easily by present producers; also, and quite important, most of the operators have sufficient funds on hand to enlarge or build new plants should the need arise, without having to ask the public for financial assistance.

One enterprising manager of a western equipment company told me he had listed 32 rumors and reports of "to be built" cement plants in the states west of the Rocky Mountains. More than likely the number of plants actually to be built will dwindle down to one or perhaps two in addition to those actually under construction; numerically one plant, that of the National Cement Co., which is building a plant at Chubbuck for production of white portland cement.

The Basis for Promotion

No doubt one factor that has excited the imagination of the promoter is the publicity given hydro-electric, irrigation and flood control dams by the different papers and magazines throughout the entire United States, some of these publications going into quite extensive calculations as to the amount of cement that will be required, leading the uninitiated to believe that when these dams are under way the cement plants on the Pacific Coast will be taxed to capacity for several years, just to supply the needs of the dam contractors, to say nothing of ordinary construction needs!

Attractive concrete structures of this type are numerous in California and form one of the chief reasons for that state's leadership in per capita cement consumption

The Damage That One Proposed Dam Did

Take, for instance, the proposed San Gabriel dam; 16,000,000 sacks of cement were said to be required (newspapers prefer the sack unit rather than the barrel unit because it looks larger in print); actually 3,442,000 bbl. would have been required, according to the engineers' estimates. The productive capacity of only the four mills that are nearest the dam site is stated to be 26,500 bbl. per day. The dam would require five years to build. On this basis there would have been used 2300 bbl. of cement per day for 300 days per year. On a basis of present utilized capacity for California of 60%, 15,900 bbl. of cement should be consumed daily. To this figure then would be added 2300 bbl. per day added output due to the dam construction, making a consumption then of 18,200 bbl. per day, or 69% utilized capacity. Yet the number of prospectuses that have been circulated with such a background is hard to say. Reports of definite nature have stated that Glen Morgan would build a plant at Little Rock, 15 miles from the dam site, and again that the county of Los Angeles would build its own plant.

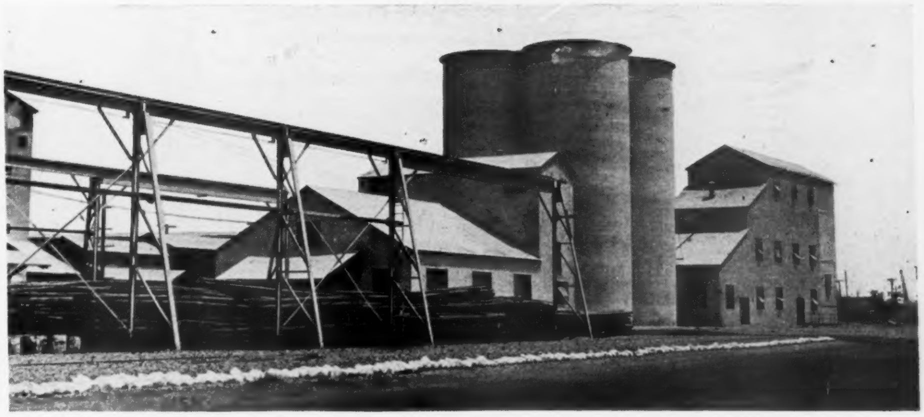
The latest reports are that the dam will not be built at all, as geologists claim that the site is badly faulted and unsafe, all of which tends to show that projects for new cement plants in southern California to supply uncertain needs are economically unsound.

So far prices have been left out of the picture entirely, but bids published in connection with the San Gabriel dam are indicative of the low prices then prevailing in that section. It might be added that rejected bids were at $1.40 per bbl., f.o.b., the mill, and later bids, based on the delivery of clinker to the dam site, with regrinding to be done there, were equivalent to $1.225 per bbl., f.o.b., the mill, or $1.545, f.o.b., the dam site.

Closed indefinitely! This shows how far one promotion plant got in San Bernardino county

Several plants are in the various stages of promotional activity, and their promoters are basing their reasons on intentions to locate nearer to the centers of consumption, among which might be mentioned the proposed plant of the Paramount Portland Cement Co., Torrence, Calif., an industrial suburb of Los Angeles, and the plant of the Bell interests, about which so much fuss has been raised by the various civic bodies in Los Angeles. Mention also might be made of the Port Stockton Portland Cement Co., which proposes to build a plant at Stockton, Calif.

Meantime two plants have been abandoned on the Pacific Coast, one being that of the Pacific Portland Cement Co., Consolidated, at Cement, Calif., and the Oro Grande plant of the Riverside Cement Co. Abandonment of these was due primarily to hold production within reasonable bounds, and for more economical operation of the remaining plants.



Packhouse, silos and grinding plant, Blue Diamond company

Pacific Coast Shipments

Following are the shipments of portland cement for the three Pacific Coast states for the time periods mentioned in this article:

PORTLAND CEMENT SHIPPED FROM MILLS INTO STATES, IN BARRELS

	California		Oregon		Washington	
	1928	1929	1928	1929	1928	1929
January	1,030,965	950,000	37,133	33,364	90,604	111,351
February	909,617	901,071	74,793	34,733	128,568	68,792
March	937,253	1,063,895	78,121	81,126	162,335	213,399
April	1,058,739	973,052	102,480	79,593	237,749	255,250
May	1,101,338	977,113	143,000	94,250	315,209	208,716
June	1,135,923	981,611	132,565	95,717	342,740	244,546
July	1,081,470	905,437	140,619	101,161	361,159	263,893
August	1,168,958	1,007,181	175,733	124,852	408,566	310,711
September	1,020,406	915,829	132,521	122,669	291,994	305,056
October	1,145,337	1,075,308	120,863	114,228	261,412	240,543
November	1,025,113	943,641	65,960	78,363	243,351	158,675
December	859,234	728,509	39,466	49,698	132,183	101,062
Total	12,472,353	11,422,647	1,243,254	1,009,754	2,975,870	2,481,994

Prices in southern California for portland cement have taken a decided turn downwards, and the industry was in the throes of a price war at this writing. Prices in the northwest, however, were stable and satisfactory, but as previously mentioned, volumes have been diminished greatly, and there have been two new mills completed in that territory during 1928 and 1929 (Pacific Coast Cement Co. and Northwestern Portland Cement Co.).

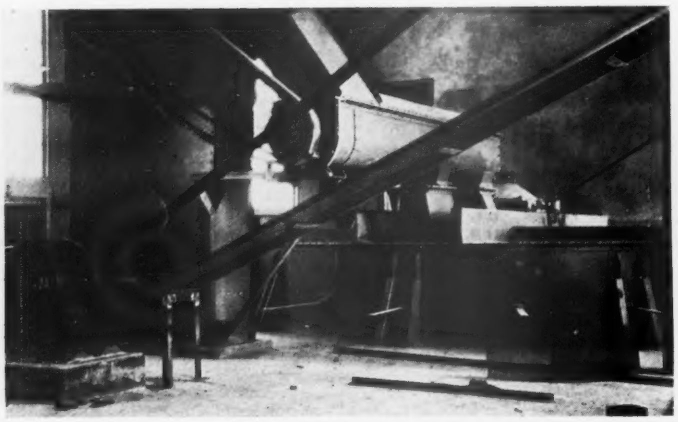
New Plants in the Southwest

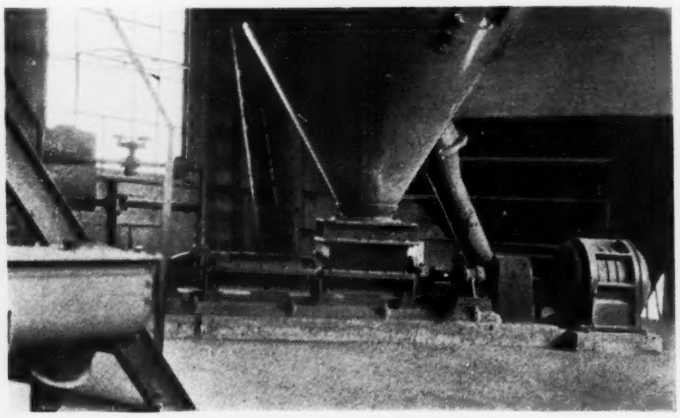
The Blue Diamond Co., Los Angeles, recently placed in operation a plant to grind clinker received from foreign sources. This is the first plant of its kind in the United States, although there have been several proposed at various Atlantic and Pacific Coast cities. The plant requires only one man to operate outside of the sacking crews, and is a model for a finish grinding department. The plant is located at 1650 South Alameda street.

The clinker is brought from the port of Los Angeles by trucks, which may be dumped directly to the grinding plant or to storage in an adjacent yard. It is taken to the plant from the yard in trucks and dumped on a grizzly of heavy rails spaced 3 in. apart. Very little of the clinker does not pass this grizzly, and if any piece remains on the rails it is soon broken by the weight of following trucks. From the hopper below the grizzly it is elevated to a hopper over the feeders. There is a hopper for gypsum beside it, which is filled by the same elevator. The two feeders, one for clinker and one for gypsum, are of Traylor make and are of the revolving table type. They deliver to a Traylor tube mill, 50 ft. long and 11 ft. in diameter, which is driven by a 900-hp. General Electric motor of the supersynchronous type.

All the product of the mill goes to a cylindrical cooler (an unusual feature in clinker grinding plants), which is in the basement below the tube-mill floor. It is like the cooler used to cool the clinker as it comes from a kiln, except that it is smaller, being about 30 ft. long and 4 ft. in diameter. It was made by the Conveyor Co., Los Angeles, and it is driven by a 7½-hp. Gen-

Another view of the Blue Diamond company's clinker grinding plant at Los Angeles

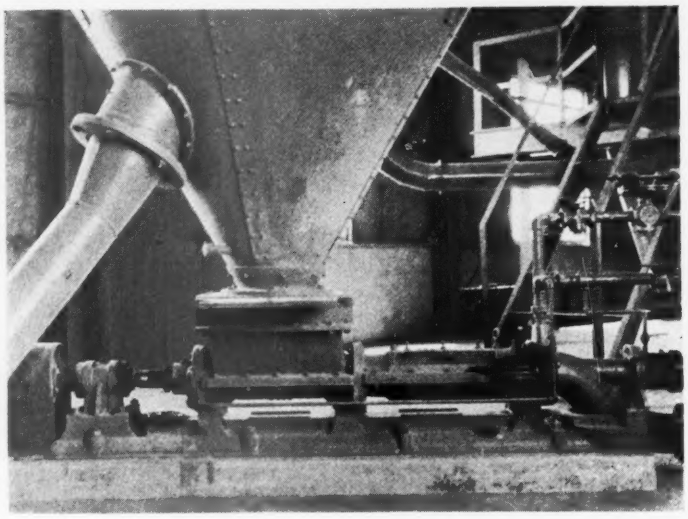




Upper (left) and lower part of the large air separator, Blue Diamond plant

eral Electric motor through a Pacific Gear and Tool Works speed reducer.

From the cooler the mill product goes to an elevator in a steel casing which lifts it to an agitator and feeder above a Sturtevant air separator. This separator is one of the largest made, being 14 ft. in diameter and 18 ft. high. The upper part is on the third floor of the building, the lower on the second floor, which is the floor above the tube mill. There are three discharges from the air separator, one for the oversize that goes to the feed end of the tube mill, another for the finished cement that goes directly to a 4-in. Fuller-Kinyon pump, that conveys it to the packhouse and silos, and a third that takes the finest dust from the separator to the Norblo dust collector on the second floor.



Discharges on lower part of the air separator—oversize to tube mill, finished cement to pneumatic pumps and finest dust to dust collectors, Blue Diamond company

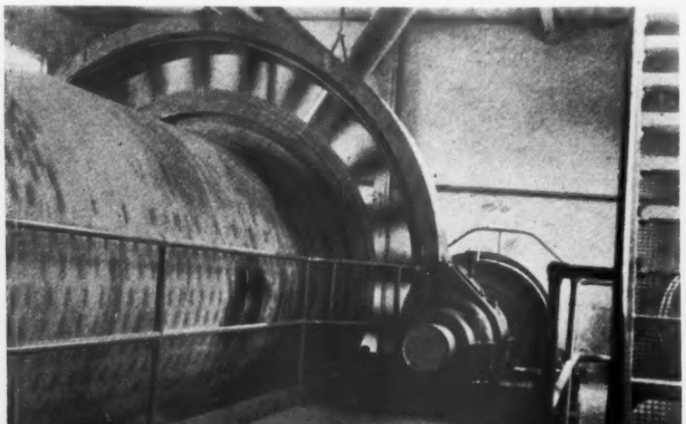
The dust collector with its fan and motor is installed on the second floor. It is connected with the elevator, points in the packhouse and with other places, from which dust might be discharged into the air; the whole grinding plant is free from dust and dirt. Not only this dustlessness, but the way in which everything is painted and kept shining makes it a pleasure to visit such a plant.

National Portland Cement Co.

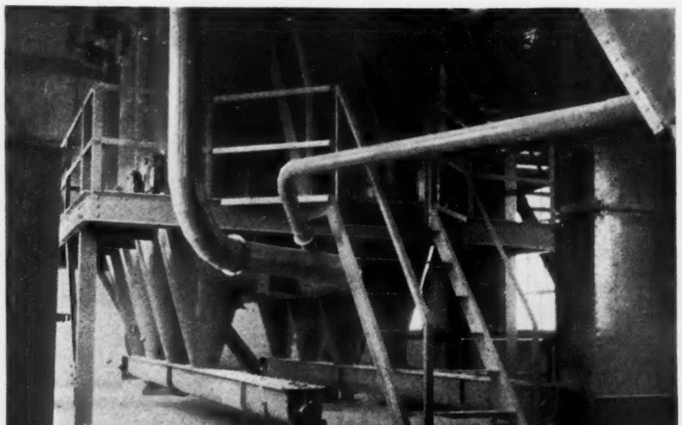
The National Portland Cement Co.'s plant at Chubbuck, Calif., to make white portland cement, is reported to be about ready for production. This company should not be confused with the National White Portland Cement Co., which was to have built a plant at Cajon Pass, near San Bernardino, Calif., but is another organization entirely with headquarters at 523 Kress building, Houston, Texas. This company also proposes to ship white clinker by boat via the Panama Canal to various ports on the Atlantic Coast, where there will be established finishing plants. A plant of this character is about completed at Houston, it is reported.

Riverside Cement to Mine Limestone

The Riverside Cement Co., Riverside, Calif., will soon be another portland cement producer to mine limestone, for it was about to start mining from a vertical shaft sunk a few hundred feet from the main plant and about midway between the plant and the



The 50x11-ft. dia. tube mill and its 900-hp. supersynchronous motor, Blue Diamond company



The dust collector connected with elevator, packhouse points and other places keeps the plant clean

General view showing the relation of the new vertical shaft to the old quarry and mill (left), Riverside Cement Co., Riverside, Calif.

older limestone quarry at this writing. Extensive core drilling revealed that there is available large areas of limestone extending to depths of 1500 ft. A very substantial steel head frame fabricated by the Consolidated Steel Co., Los Angeles, has been erected and a double-drum, Wellman-Seaver-Morgan electric hoist installed in a separate steel building for hoisting the skips. The electric hoist is one of the latest types, and is said to be the largest of its kind in any rock products industry, and truely so of any in the cement industry. Two new Ingersoll-Rand, Class PRE, two-stage compressors, 21x29 in. on low side and 21x18 in. on the

Head frame at the shaft of the limestone mine, Riverside company

high side have been also installed in this head house to supply air for the mine drilling and other purposes. Each of the compressors is direct-connected to a 300-hp. motor.

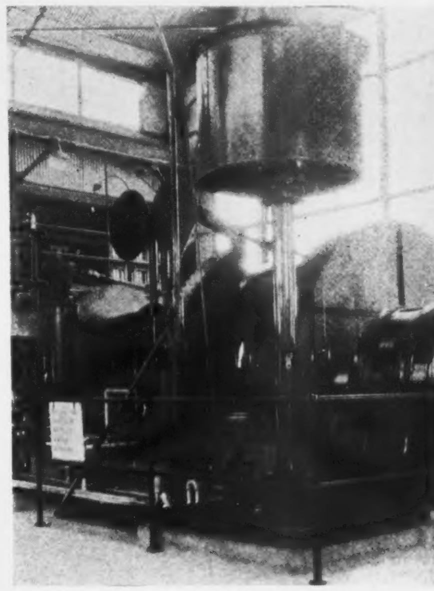
It is proposed to mine the rock by the shrinkage stoping method; the mined stone will be dumped to bins at the head frame of the shaft and transported to the old crushing plant. Preliminary crushing is done by a 5x7x9-ft. Traylor jaw crusher, followed by a Williams "Jumbo" hammer mill for second stage reduction.

Closed-Circuit Grinding

The plant has a capacity of 8500 bbl. per day and uses 12 kilns, 8x10x120 ft., oil-fired and with clinker brick linings in the hot

Motor trucks haul limestone from the Riverside company's open quarry

zone. Two-stage grinding on both the raw and finished end is practiced, with "Hummer" screens in closed circuit with Bradley "Hercules" mills. The 11 tube mills receive on the raw side a feed having a screen analysis of 95% minus 30-mesh and 100% minus 20-mesh, with the discharge of the tubes held at 91 to 92% minus 200-mesh. On the finish side three 8x12-ft. ball mills are operated in closed circuit with "Hummer" screens, followed by tube mills. The screens have the same sized cloth as those used on the raw end. Schaffer poidometers

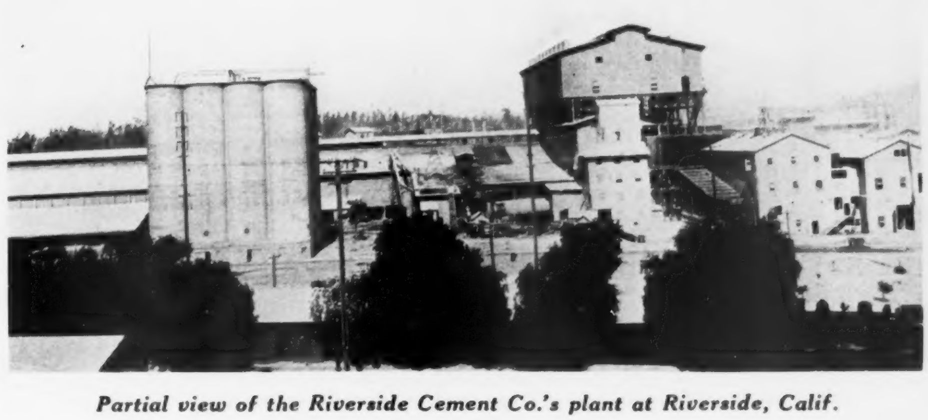


The large electric double-drum hoist in use at the mine, Riverside company

are used for proportioning the cement and gypsum with Fuller-Kinyon pumps for conveying the ground cement to the storage silos.

Natural gas is used for fuel, about 3,000,000 cu. ft. per day being required. Considerable experimental work has been done in an attempt to use Dubbs coke as a fuel. This is a residual coke from oil distillation and is cheaply available in southern California, but its use at the Riverside plant has not been generally adopted.

Power is generated from waste-heat boilers consisting of three Sterling and one Kidwell boilers, with one main flue connecting all boilers. The boilers were installed by Hunt, Mirk and Co., San Francisco. Two 3000-kw. General Electric turbines and a



Partial view of the Riverside Cement Co.'s plant at Riverside, Calif.

New plant for production of plastic cement, Riverside company

Storage silos and packhouse, Yosemite Portland Cement Co., Merced, Calif.

3200-kw. Westinghouse unit are operated from the waste-heat plant.

New Plastic Cement

A plant for grinding "Plastite" cement was placed in operation during this year. Plastite is the name given this company's plastic cement, and consists of a chemical ingredient made by the Western States Chemical Co. that is added to the clinker along with the gypsum before grinding. The three products are dumped to a bin serving a 6x24-ft., two-compartment Compeb mill, and are ground to a fineness of 96 to 97% minus 200-mesh. The mill at this fineness has a capacity of 25 bbl. per hour, and is driven by a 250-hp. General Electric induction motor through a Pacific Gear and Tool Works reduction unit. The finished Plastite cement is pumped to two new silos holding 1000 bbl. each by a Fuller-Kinyon pump.

Storage Capacity Increased

Recently reinforced-concrete silos were completed for finished cement, having a capacity of 200,000 bbl. This with previous storage capacity gives the plant a total storage of 270,000 bbl. There are four silos having a capacity of 25,000 bbl. each and eight of 5000 bbl., which with the star and interstitial bins gives the total above stated.

Cottrell electrical precipitators are used for dust collection and incidentally this installation was one of the first Cottrell units to be installed in any industry.

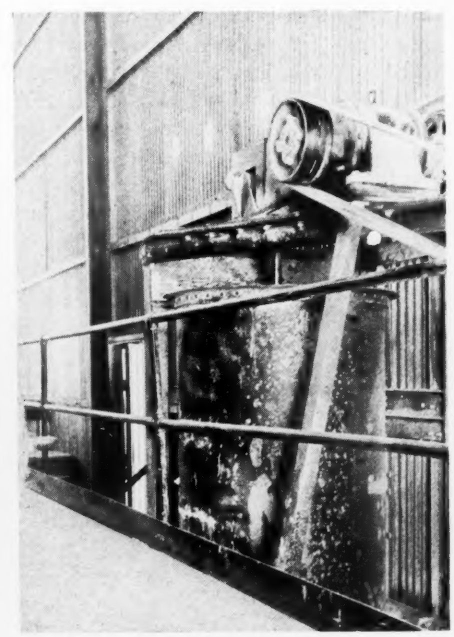
The company is one of the most progressive in the Southwest, maintaining a research staff for the development of new products and practices. Earl McDonald is general superintendent; T. E. Mullen, chief chemist, and Hubert Wood is in charge of the research work.

Monolith Now Mining Limestone

The Monolith Portland Cement at its Monolith, Calif., plant also recently started mining limestone, using the glory-hole method and under conditions that are about as ideal as any found in the portland cement industry.

Slurry is pumped over a vibrating screen on top of the slurry tanks before passing to the tube mills, Yosemite company

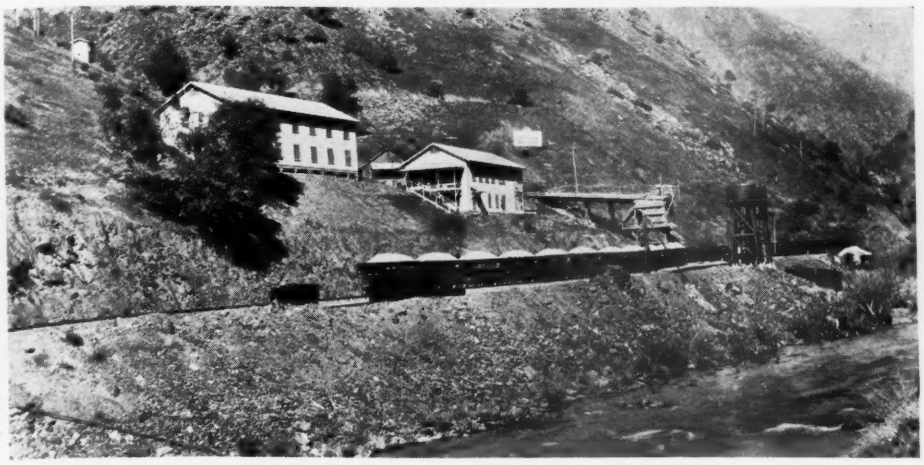
The company's engineers ran a tunnel into a limestone mountain approximately 600 ft., and at a point 550 ft., from the portal, drove a raise through to the surface, about 300 ft.



Feeder by which diatomaceous earth is added to portland cement to make a special cement, Yosemite company

above. The raise is paralleled by a man-way raise with cross cuts at intervals of 50 ft., so as to make the main raise accessible in the event a large rock should become keyed

Open storage at the Merced, Calif., plant, Yosemite Portland Cement Co.



Loading terminal and employes' quarters at the Emery, Calif., quarry of the Yosemite Portland Cement Co.

in this raise and prevent the flow of rock from above. In addition to this there is a bulldozing chamber above the chutes in the raise, so that any rocks too large to go through the gates can be bulldozed at this point. It is estimated that there is enough limestone available through this glory hole to manufacture several million barrels of cement.

Substantial savings are said to have been made by introducing this method of securing limestone. It has done away with the use of steam shovels entirely and some of the men that were necessary in the open-face quarry work.

The company at present is drilling with four hammer drills but expects to add one or two more as the cone becomes enlarged. A few hours' drilling per day suffices to supply enough rock to fill the bins. Much of the rock is broken in coming down the chute, thereby saving some drilling, powder and grinding costs.

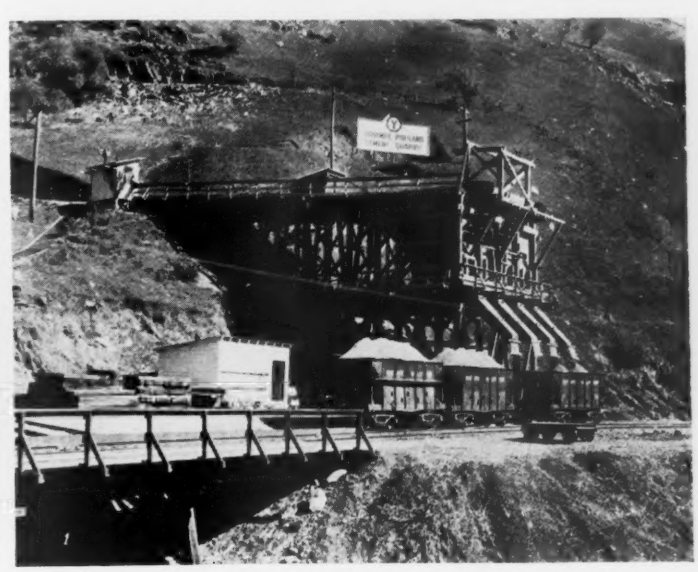
Yosemite Portland Cement Co.

The plant of the Yosemite Portland Cement Corp. at Merced, Calif., started operations in 1927 and has been in continuous operation ever since. The plant was designed and constructed by the company in conjunction with the Stevenson Engineering Co., consulting engineers, and in the June 11, 1927, issue of ROCK PRODUCTS a complete description of the plant and quarry was published. No drastic changes have been made either at the quarry or plant since that time, but mention should be made that the company has discontinued the use of variable-speed, direct-current motors for regulating the Ferris wheel slurry feeders at the kilns, installing instead a long single rope drive that takes its power from the drive mechanism of the kilns, so that a change in speed of the kiln makes a corresponding change in the rate of feed.

The colloidal clay from the 26-ft. Allis-Chalmers wash mill is fed to the discharge

The quarry is located at the top of the mountainside, crushing plant about 2000 ft. away and loading terminals in the valley, Yosemite company

A part of the Yosemite company's quarry



Loading cars at the terminal, Yosemite company

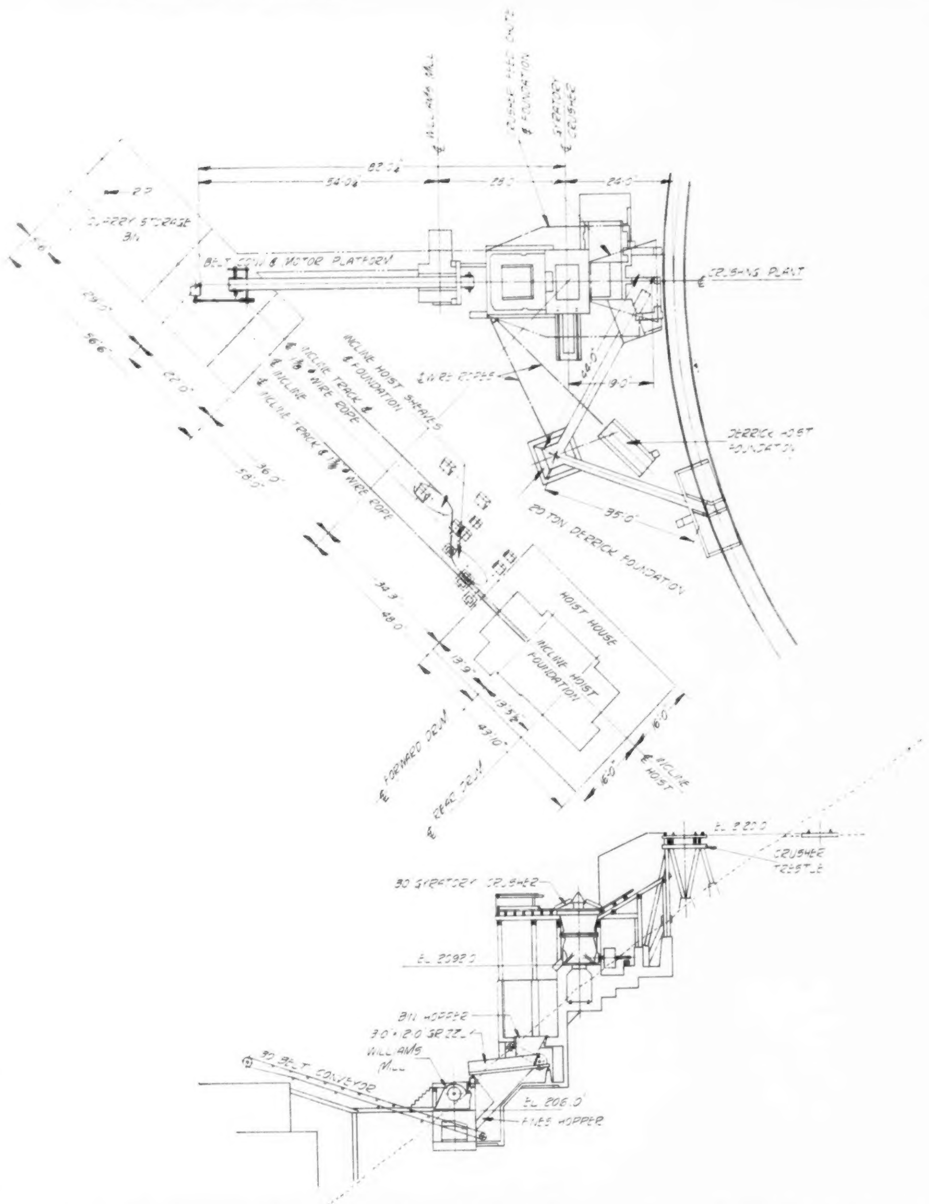
end of the raw Compeb mills, but to insure a material of uniform fineness a Hum-mer screen has been installed on top of the slurry tanks, and the slurry is pumped over this 20-mesh screen. The oversize, normally a very small amount, falls to the ground storage pile and intermingles with the crushed limestone.

The plant contains two 10x240-ft., Allis-Chalmers, 4-bearing kilns; two 7x26-ft, two-compartment Compeb mills for raw grinding, and two for finished grinding. The Compeb mills are driven by two 500-hp., Allis-Chalmers, synchronous motors, but the balance of the motors in the plant are of Westinghouse make. Fuller-Kinyon pumps deliver the finished cement to the 60,000-bbl. stockhouse some 600 ft. from the grinding plant.

Unusual Mountainside Quarry

Crushing is all done at the quarry located at Emery, Calif., 58 miles east of Merced and 11 miles west of the entrance to the famous Yosemite valley. The deposit lies near the top of a steep mountainside, with the crushing plant located about 2000 ft. from the quarry. Stone from the crusher passes through a 30-in. McCully gyratory to a Sheridan grizzly, the oversize falling to a No. 6 Williams hammer mill set to deliver a 1-in. product.

The crushing plant is about 800 ft. above the Yosemite Valley R. R. over which shipments are made to the plant. A balanced incline electric hoist runs between the crusher bins and loading plant. A 10-ft. Wellman-Seaver-Morgan Co. air-operated hoist is used for lowering the 20-ton skips down the mountainside. The compressed air for operating the hoist is supplied by a small compressor driven from the hoist mechanism; this reduces wear on the water-cooled brakes. Air for drilling is supplied by two 600-cu. ft. per min. Ingersoll-Rand compressors.



Side elevation and plan of crushing plant at Emery quarry, Yosemite company

Oil-Well Cement in Demand

The company manufactures considerable oil-well cement, which is a special portland cement, used for cementing off water in oil wells and other uses in the oil fields. The cement for this purpose must develop a reasonably high early strength, be plastic so as to be readily pumped to the bottom of the

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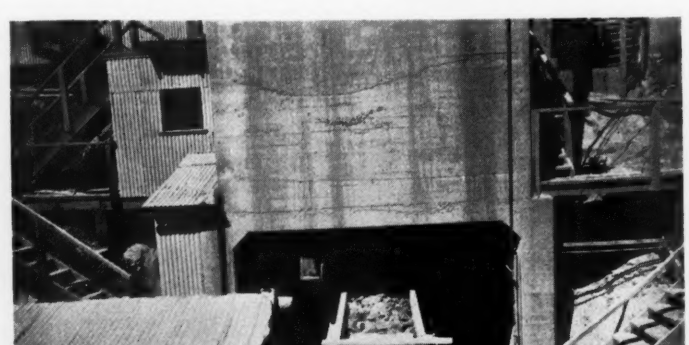
Cars dumping to primary crusher, Yosemite company



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Grizzly separating primary crusher products, Yosemite

drill hole, and the higher the specific gravity the better for the same reason. The cement is shipped in multi-walled paper bags, which are filled from a Bates packer that has been installed for this particular cement.

Special Admixtured Cement

This company also makes a "Celited" cement, on order, by adding 3 lb. of Celite (diatomaceous earth) per sack to ordinary portland cement as it is discharged from the finish Compeb mills. The Celite is not ground with the cement nor is it ground separately, but is passed to the cement stream by a special feeder that regulates the flow of this material as well as breaking down any lumps that may be present.

Clinker brick are used for lining of the hot zone of the kilns. These are made at the plant by hand-mold methods. There is nothing particularly difficult about making these brick; the clinker first is screened to remove any large lumps, after which a rather dry mix of cement, clinker and water in the ratio of 6 to 1 are hand tamped into the molds. The brick are kept damp for 28 days, after which they are ready for use. Thoroughly drying before laying in the kiln does not seem to be as essential as to have the brick thoroughly aged before using, as the life of a poorly cured brick is said to be considerably shorter than the properly cured clinker brick.

The kilns are oil-fired, the oil being preheated before use so to regulate its temperature, a recording Foxboro thermometer being used. Thwing recording thermometers are used for stack temperature measurements. The air and oil pressures are controlled by Foxboro and Bristol recording instruments.

G. A. Fisher is general manager; T. K. Holems, sales manager; A. P. De Jonckheere, plant superintendent; H. McL. Lamour, chief chemist, and S. C. Pierce, plant chemist.

(To be continued)

Gypsite Deposits in Florida

STRAUSS LLOYD, writing a recent issue of *Florida Engineering and Construction*, gives some interesting details of his prospecting and study of the Withlacoochee river basin gypsite deposits, from a point known as Stokes Ferry to the point known as Camps Landing, a distance of 30 miles, north and south, and also a distance of 8 to 10 miles on each side of the river, east and west in that direction from the river, embracing portions of Marion, Sumter and Citrus counties. The article states in part:

"Commencing at a point in the very northern portion of this territory, known locally as 'Long Arm Swamp,' there are found deposits of gypsite. In this territory there are outcrops almost every 300 yd., and drill holes put through this formation shows that the deposits were in thickness from 3 ft. to about 12 ft. At Stokes Ferry, the river has eroded a large strata of the gypsite and there the thickness of the strata at that time appeared to be even more than the measurements as above set out, but on account of the depth of the water at this point it was impossible to make any accurate measurement.

"The general extent of these deposits extends from what is known as 'Cow Head Cypress' in Citrus county to Jumpers Creek in Sumter county, and covers an area of about 10 miles in length. Within this territory there is also another point known as Alto Ferry on the river where at one time a small mine was in operation and the gypsite was mined and milled and was shipped by boat down the river. The same firm mined at another point within the territory, known as 'Shell Mound.' The width of this deposit from a quarter of a mile on the Citrus county side of the river to perhaps nearly one-half of that distance.

"The quantity of gypsite is almost uniform in all places where samples were taken and is evidently sufficient for a large supply. The one difficulty that would attach in actual mining of this material is the fact that the lumps of limestone would be encountered at irregular intervals, and their character makes it evident that they are residual lumps of limestone which have been dissolved by the action of rain water.

"It was estimated from the prospecting done that there was 500,000 tons, and while there is a tendency of this particular deposit to be somewhat scattered, it could be worked in very dry weather by the use of small steam or other light shovels to remove overburden and the gypsite at a very low cost, but it is not the nature of this article to go into the details of mining. The deposit has been under consideration by some capitalist with a view of working it for the manufacture of plaster.

"The next deposit of any importance is that located at Shell Mound. This deposit was visited by Dr. Calhoun of Clemson College, South Carolina, and while Dr. Calhoun has made some report on it, the observations of this writer will not agree with those of Dr. Calhoun in regard to the amount of gypsite and overburden.

"Passing on down the river, there was located another deposit, very much scattered and well mixed with the muck and decaying organic matter of the river bed, and just south of what is known there as 'Rutland Ferry Bridge.' This deposit is found mostly in the river bed and was so much deeper in water than the 'Dead River' deposit that it was impossible to get an estimate of the amount of tonnage, but it was estimated that this deposit, the Shell Mound deposit and the 'Dead River' deposit, there was something like 300,000 tons of gypsite.

"Those points examined by Dr. Day and Dr. Calhoun and some others, and known locally as Bear Island, Soapstone and Burnt Island, located in section 23, township 20, range 21, the investigations here made would bring fact in discord with all previous reports made on these deposits. In the first place, the examination disclosed that the strata were thicker than those previously reported, as the drill holes placed through the strata at this time were put down closer together and in a more systematic manner than had been shown in the previous work.

"This investigation revealed the fact that there were many points in the deposits where it ran as much as 15 ft., and also the area of these deposits was found to be of greater extent than was shown by any former explorations, and that there was territory not touched by Mr. Houston of Brooks, Fla., and by none of the others who had made investigations of this material.

"Examination indicates that the Soapstone Island deposit approximates 500,000 tons, Bear Island about 400,000 tons, and that of Burnt Island, 131,000 tons."

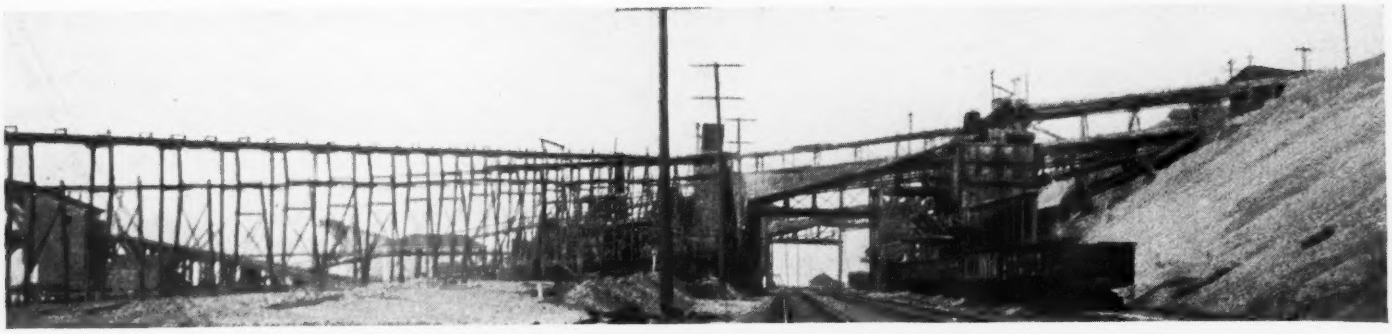
The author goes into the geology of the region, propounding the explanation that the sulphur encountered there at times had been formed by the decomposition of the gypsite into its natural elements. He believes that by proper prospecting a large deposit of sulphur might be found somewhere in that section of Florida.

Research in Low Cost Roads

THE need of low cost roads is being felt increasingly as the main arterial highways are built and feeders are required to open them to the agricultural producing sections. But according to a paper by R. W. Crum, director of the advisory board on highway research of the National Research Council, considerable research must be done before such roads can be designed and constructed in the most economical manner.

The paper, delivered before the 1929 Asphalt Conference, lists several subjects for research under the headings of financing, climate and weather, surface conditions, construction methods and so on, but the recommendations which most nearly touch the rock products industry are:

1. Data on effects of weather and climate on various combinations of materials.
2. Data on effects of traffic.
3. Rate of wear of water-bound and traffic-bound roads and effect of dust prevention measures thereon.
4. Salvage value of such surfaces in connection with change to highway types.
5. Critical study of various types of surfaces now in use.
6. Design of cross-section for bituminous macadam.
7. Characteristics and methods of testing materials.
8. Data on relation between quantity and kind of traffic and maintenance costs.



General view of the Pioneer Sand and Gravel Co.'s operation at Steilacoom, Wash.

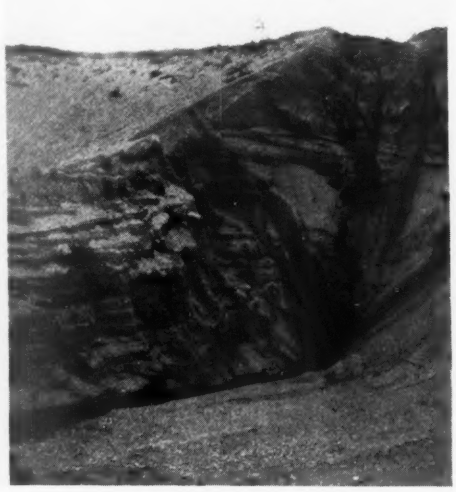
Sand and Gravel Developments at Steilacoom, Washington

STEILACOOM, Wash., the hub of the sand and gravel industry supplying the cities of Seattle, Tacoma and the Puget Sound territory as a whole, lies 13 miles southwest of Tacoma, on the Northern Pacific and Union Pacific railroads and on the margin of Puget Sound. The deposits at that place, operated for many years by the Pioneer Sand and Gravel Co., have been described from time to time, notably in the November 14, 1925, issue of Rock Products. Unquestionably they form one of the largest commercial gravel deposits in the United States and some idea as to their size can be gained from the data supplied by the Glacier Sand and Gravel Co., which has a deposit and plant adjoining the older plant of the Pioneer company. The newer company's holdings cover an area of many acres, all underlaid with a bed of gravel 280 ft. thick which is remarkably clean and uniformly sized. This deposit represents 500,000,000 cu. yd. of proven material having a content of 65% gravel and 35% sand, of which only 5% is material over 3 in. and fines or wasted material as, in this operation, no crushing is at present being done. There is little or no overburden.

Changes in Pioneer Pit Operation

At the Pioneer plant hydraulic sluicing was practiced until about 1924 and the company and deposit became unique, it might be said famous, throughout the industry for that as well as other reasons. Later steam shovel excavation supplanted the hydraulic operation as a primary mover, although hydraulicking is still practiced as a secondary transportation method. Still more recent changes have been made in the method of loading at the pit.

Primary loading is now by means of a No. 125 Marion electric shovel with a 4-cu. yd. bucket that discharges to a field hopper serving a 36-in. portable field belt conveyor. The conveyor was built by the Isaacs Iron Works of Seattle and uses Alemite lubricated Robins carrier and return rolls and Hewitt Gutta Percha Rubber Corp. belting. The roll support and frame are of steel and in 30-ft. sections, so as the pit is extended a piece can be spliced into the conveyor belt, a 30-ft. section of carrier rolls added and operations resumed. This field conveyor is operated in two sections of 15 portable units each, with each section driven by a 40-hp. General Electric motor through a W. A. Jones herringbone gear reduction unit in one case and an open gear reduction unit in the other.



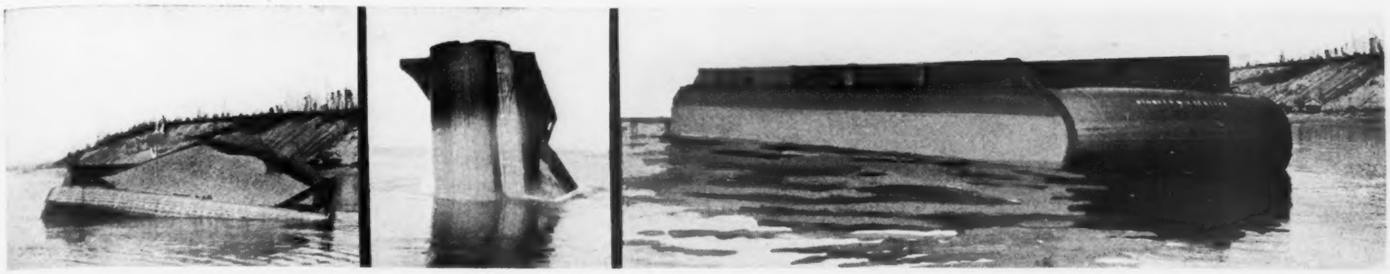
Part of the 280-ft. bank of clean sand and gravel at Steilacoom

The conveyor discharges to the old original track hopper from which the 12-ton capacity cars are loaded before hoisting up the incline to be dumped to the storage pile. From this storage pile, holding approximately a 24-hour run of gravel and sand, the material is sluiced as formerly to launders that deliver to the older washing plants. No changes in washing or screening practices worthy of note have been made since the first plant description; salt water is still used for sluicing and washing of the gravel without any fresh water rinsing before loading for shipment.

No storage other than bin storage is provided for at the plant, the materials all being shipped to some of the company's distributing yards in Seattle or other localities. A large fleet of eight scows, company-owned barges, five tow boats and several other pieces of leased floating equipment serve points in the Sound as well as delivery by rail.

Unusual Self-Dumping Barges

Any unwanted sizes, waste or other refuse that was formerly flumed to waste is now loaded on specially constructed barges and towed out a short distance into the Sound and dumped. The novel feature of these barges is that they are self-unloading, but not in the sense as understood in the transportation of sand and gravel on the Great Lakes. These barges, when it is desired to unload, are tipped over bodily, and what was the bottom then becomes the deck and is again used for loading. Tipping is effected by allowing water to enter specially constructed compartments arranged longitudinally on each side of the barge, which when filled tip the barge completely over. The compartments are so designed that when once the barge has been discharged the water drains back to the sea without pumping. By reference to the illustration it readily can be seen how this is done. The barge holds 550 cu. yd. of material, requires one minute to dump, and 10 to 15 minutes for the water to drain from the compartments. Its dimensions are 140 ft. long, 35 ft. wide and 12 ft. deep from deck to bottom, exclusive of a 5-ft. retaining wall and each bottom and top deck. Similar barges are now in use on the Denny Hill job at Seattle, where material excavated from Denny Hill is hauled via an elaborate system of belt conveyors to Puget



Action pictures of the self-dumping barge in use by the Pioneer company. At the left, the water compartments have started to fill and the barge is beginning to tip over; center, the barge is about to flop over entirely; right, the barge has tipped completely over, its bottom now becoming the deck and ready for loading

Sound, loaded into barges of this self-unloading type and towed out into the bay, where they dump. The design is patented.

Glacier Sand and Gravel Co.

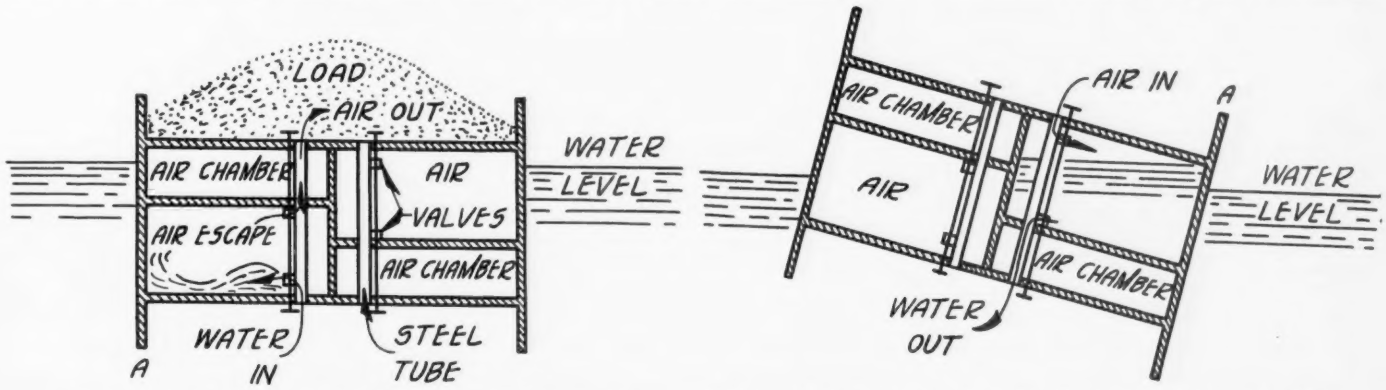
The Glacier Sand and Gravel Co., referred to in the preceding paragraphs, was formerly known as the State Sand and Gravel Co., until about three years ago, when this company was taken over by J. T. Heffernan, Sr. His son, J. T. Heffernan, Jr., is now general manager in charge of all operations. The Heffernans immediately began an extensive construction and alteration program, until a plant operation is now in evidence that ranks quite high as an economical producer. Large tonnage, remarkably low labor cost, low power requirements, simplicity and flexibility of operation are the high notes of this interesting operation. The Glacier company's owners used to have extensive interests in the dry dock and shipyards on the Sound and are keen, alert business men, thoroughly familiar with market conditions in the Northwest. The company does not maintain a selling organization, disposing of its entire production to the neighboring Pioneer Sand and Gravel Co., which has strategically located distribution yards in Seattle. Thus the Glacier company is only a production company.

All-Barge Shipping

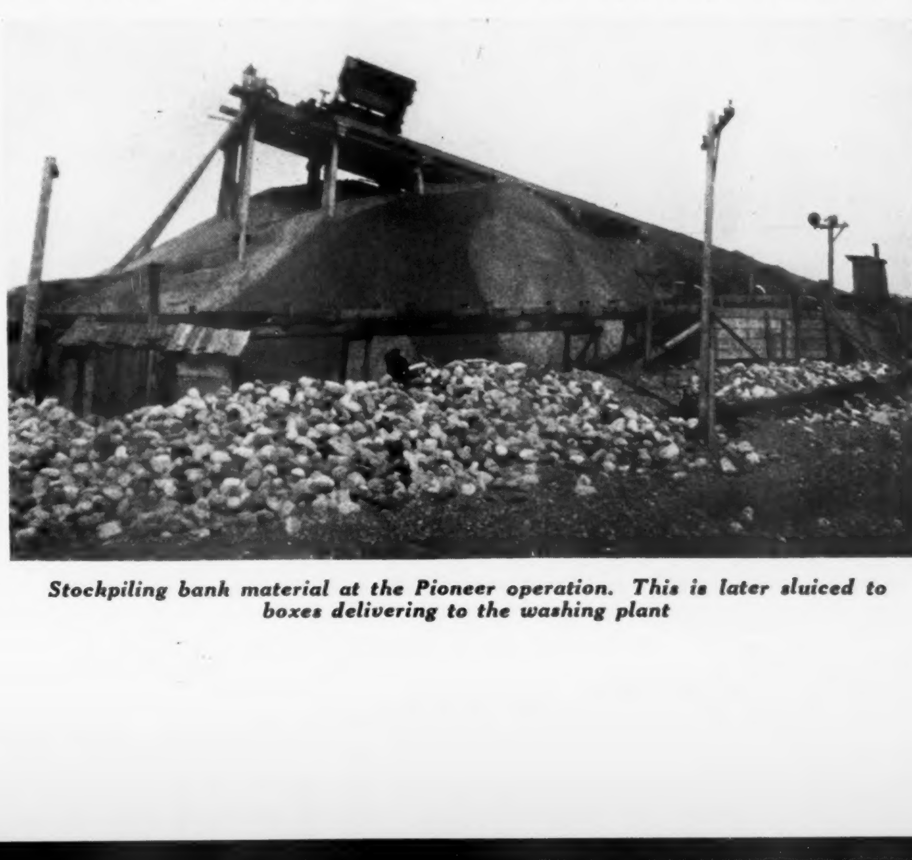
The Glacier company also ships by barge, but owns no transportation equipment of this kind. Barges can be either loaded from bunkers below the washing plant or by modifications of some part of this loading equipment they can receive material from the storage pile. Incidentally, if desired, the material in the stock pile can be rewashed or resized without difficulty and economically by passing through the plant a second time and thence loaded. The barges are loaded flat, the tops being trimmed by a hand-operated pivoted spout that chutes the material from the belt loader to the barge. Scows are moved ahead, while loading, by a hand-operated winch. The loading rate is about 750 tons per hour.

At present no railroad car shipments are made, but facilities are being provided so that each can be loaded from overhead bunkers fed by a belt conveyor from the main stock pile. Shipments will be made over the Northern Pacific and Union Pacific railroads. Trackage and switching facilities will be sufficient to hold 100 cars. Also the cars are to be switched by their own locomotives, so that large orders for commercial stone or railroad ballast can be made without the inconvenience or delays usually encountered when depending on railroad-owned switching engines. A 30-ton gas or electric locomotive is being considered for this work.

To date approximately 2,000,000 cu. yd. have been removed from the pit by means of a 4-cu. yd. Bagley scraper and a 2-yd. Sauerman "Cresent" drag scraper installation. The Bagley scraper is powered by a

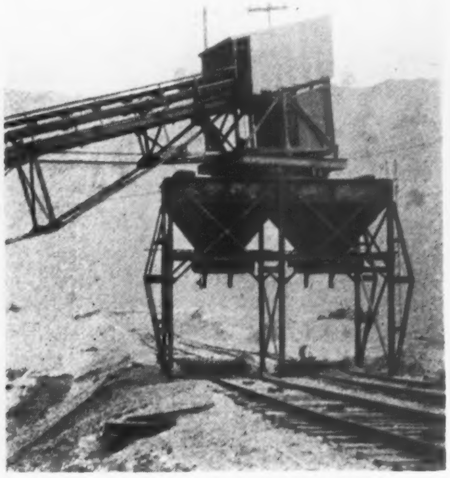


Cross-section views of the patented self-dumping barge. Left, ready to dump, and, right, the barge righting itself



Stockpiling bank material at the Pioneer operation. This is later sluiced to boxes delivering to the washing plant

150-hp. electric motor direct connected to a Washington Iron Works hoist, and the "Crescent" outfit has a 75-hp. motor and a Lidgerwood hoist. The larger scraper accounts for the bulk of the material at present being loaded and has a maximum haul



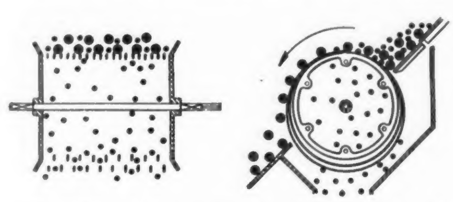
Portable conveyors in the Pioneer pit deliver to this hopper for loading tram cars

of about 500 ft. delivering to a hopper serving a 24-in. belt conveyor at the rate of 300 cu. yd. per hour. The 24-in. conveyor belt referred to is soon to be replaced by a 42-in. belt to give greater capacity.

The plant is located for the most part on piling over Puget Sound, with the main lines of the railroads referred to separating the plant and gravel pit so that the conveyor carrying excavated material has to pass through a tunnel under the tracks. The belt at the discharge end elevates slightly and discharges to a Burch ring-type non-clog grizzly made by Stephens-Adamson Manu-

Part of the deposit and portable field conveyor, Pioneer company

facturing Co. It consists of two concentric end castings and a series of steel rings of two diameters, supported and spaced alternately by the cross shaft. The steel rings are spaced on 4-in. centers. Material to be screened is fed to the outer surface and any oversize passed to waste by the rotation of the grizzly. During ordinary operations about two cars per day of plus 3-in. material, brush, roots, etc., are removed by the grizzly. This waste falls to a 1-cu. yd. Koppel car and is trammed to the waste barge



Details of the non-clogging grizzly at the Glacier pit

or to the dump for final disposal. A 250-cu. yd. capacity, hopper-bottomed, dump scow is sometimes used for disposal of plant waste.

The minus 4-in. material falls to a second 24-in. belt conveyor and is elevated to the two parallel sets of Gilbert (Stephens-

Reciprocating chute for loading barges evenly at the Glacier plant

Adamson Manufacturing Co.) conical screens. There are four screens to each set, arranged as shown in the sketch, with the feed material entering the screen having the 1⅝-in. round openings, instead of first passing to that screen having the largest opening; 3-in. round, in this case. Standard practice for installations of this kind has been with the screens arranged in a straight line, but a study of this arrangement will show its advantages.

Salt water is used for washing, with the final rinse of fresh water at the loading

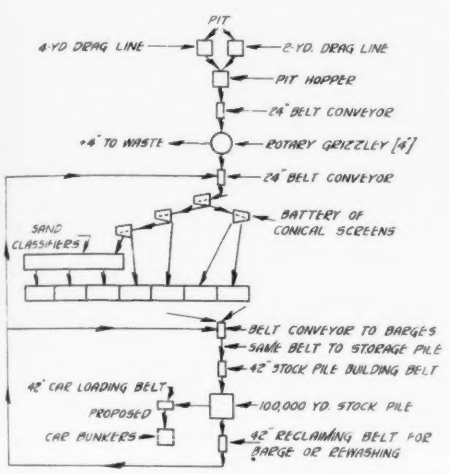
Stockpile and overhead conveyor galley, Glacier company

Plant bunkers at the Glacier operation

chute, although later it is the intention of the management to secure fresh water from wells sunk into the pit floor and do away with the use of salt water entirely. Clean salt water is at present supplied to each of the screens.

Screening Practice

The fines from the last screen (minus 3/16-in.) are flumed to the home-made sand settler boxes with an additional 2-in. stream of clean salt water being added at the flume. Sands are classified for building, engine, plaster and paving purposes from these



Flowsheet of operations, Glacier Sand and Gravel Co.

flume-type baffled settlers. Building and paving sands are the only sands that are stock-piled, however. The different grades of sand and gravel fall to hopper-bottomed, self-draining bins, below which is a 42-in. belt conveyor so arranged that the barges can be loaded by running the belt in one direction. By reversing the run of the belt it can be made to serve as one step in the stock-pile rebuilding method. Material from the stock pile can also be delivered to this tunnel belt for barge loading.

About 3000 g.p.m. is used in the plant and this is secured by two De Laval centrifugal pumps, each direct connected to 50-hp. Allis-Chalmers motors and located in a concrete pump house above high-tide level.

Seattle Specifications

Builders sand in the Seattle territory has the following specifications:

4 mesh	Minus 100%
6 mesh	100 to 93%
8 mesh	100 to 84%
14 mesh	86 to 64%
28 mesh	60 to 40%
48 mesh	32 to 12%
60 mesh	0 to 60%

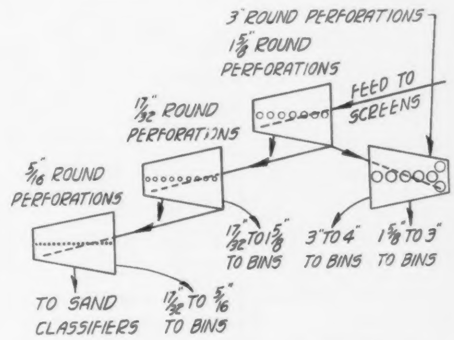
The paving sand requirement is as follows:

No. 3 screen	All minus 100
93% on	No. 4
78% on	No. 6
58% on	No. 10
38% on	No. 20
28% on	No. 30
18% on	No. 50
11% on	No. 80

Stockpiling and Reclaiming

The stock pile holds about 100,000 cu. yd. of sand and gravel and is built over a 15x22-ft. tunnel, 900 ft. long, through which runs a 42-in. reclaiming belt. The extra width of the tunnel is for the later installation of a second 30-in. reclaiming belt that will run in the opposite direction and be used for filling the carloading bunkers. This tunnel belt and all others used in the plant were supplied by the Goodyear Tire and Rubber Co. The reclaiming belt operates at 350 r.p.m. and is driven by a 100-hp., 1160-r.p.m. Westinghouse motor through a type D30 Western Gear Works speed reducer having a 55.5:1 ratio of reduction.

The washed gravel or sand in the bins falls to the previously mentioned loading-reclaiming belt, which delivers to a 42-in. inclined cross belt. This belt operates through a slope of 18 deg., is 270 ft. c. to c. and delivers to a second 42-in. horizontal,

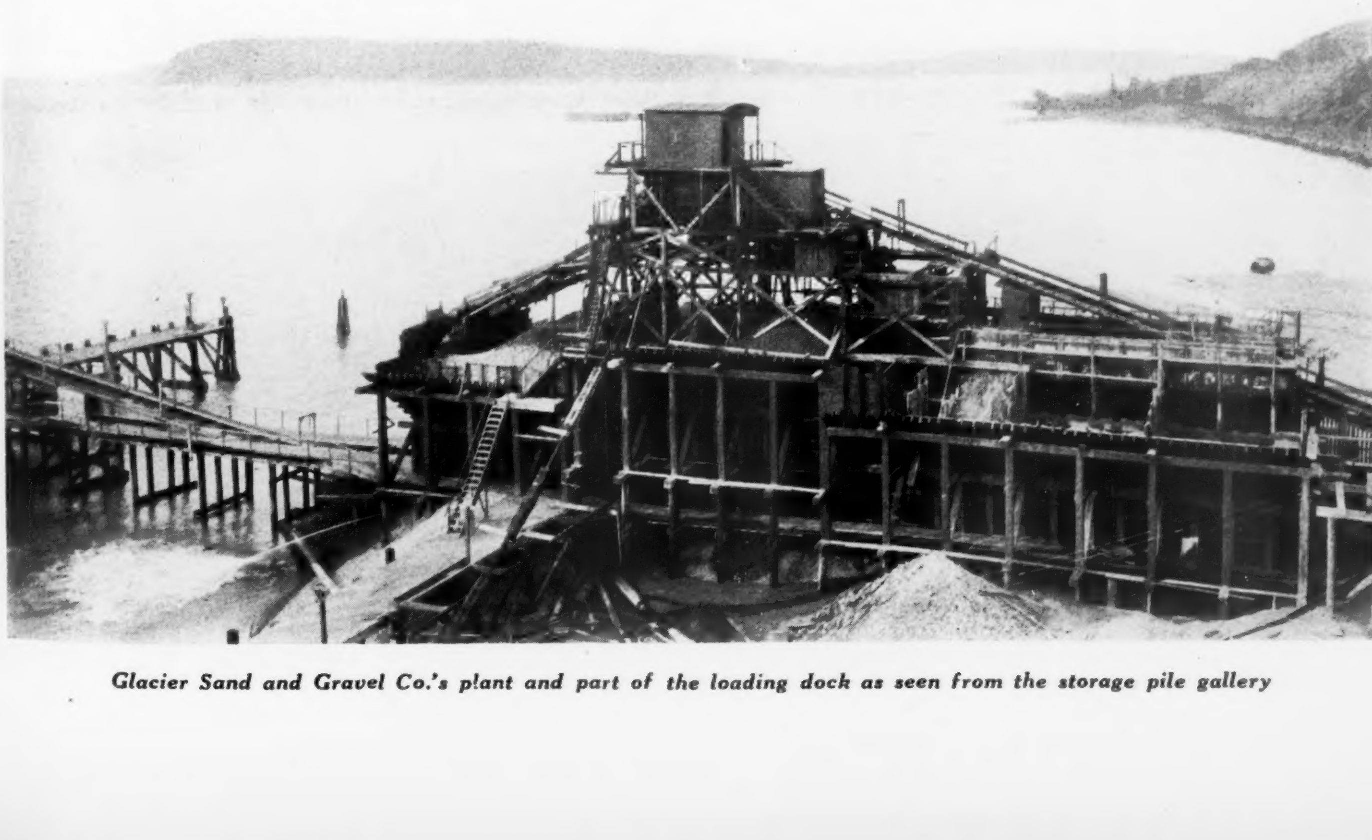


Screening installation at the Glacier plant

400-ft. c. to c. belt running in a steel gallery over the stock pile. These two belt conveyors as well as the reclaiming belt are equipped with Stearns, 3-roller type carrier and flat return rolls, Timken roller bearing and Alemite fittings. To insure long life for these belts, 60-in. head and tail pulleys are used and the upper horizontal belt unloaded by a Link-Belt, mechanically moved tripper. The belts all have gravity takeups.

The plant is all on made ground or pilings with the motors and drive mechanism of the stockpile building equipment resting on separate pilings from the conveyor galleries so that any settlement of the tunnel or gallery due to the superimposed loads will not affect the alignment of the drive.

The stock pile upper conveyor is 75 ft. in the clear above the top of the tunnel to pro-



Glacier Sand and Gravel Co.'s plant and part of the loading dock as seen from the storage pile gallery

MOTOR SCHEDULE, GLACIER SAND AND GRAVEL CO.

	Hp.	Type	Drive	Ratio of reduction of gear reduction unit
42-in. horizontal belt, stock pile	75	Westinghouse	Western Gear	54.7:1
42-in. inclined belt, stock pile	100	Westinghouse	Western Gear	55.5:1
42-in. reclaiming belt, stock pile	100	Westinghouse	Western Gear	55.5:1
24-in. pit belt to grizzly	35	General Electric	Link-Belt enclosed chains	....
24-in. belt grizzly to washer	50	Allis-Chalmers	Link-Belt enclosed chains and gears	....
Conical screens	30	Allis-Chalmers	Link-Belt open chains	....
42-in. belt under plant bunkers	40	Allis-Chalmers	Open gears	....
No. 1 centrifugal pump	50	Allis-Chalmers	Direct connected	....
No. 2 centrifugal pump	50	Allis-Chalmers	Direct connected	....
No. 1 hoist	150	....	....	....
No. 2 hoist	75	....	....	....
	755			

vide for the 100,000-ton storage. The bunkers under the washing plant hold 3500 tons, so that it is practical under almost any conditions to deliver either sized stone separately; to remix immediately after washing; to remix from the stock pile, or to remix simultaneously from both sources, giving a flexibility of operation that is found in very few plants. Four men are required in the washing plant and two in the pit, which for the tonnage specified ranks this plant as among those of minimum man-power requirements.

Electric power is purchased from the Puget Sound Power and Light Co. and is delivered to the plant at 13,000 v. and stepped down in company-owned transformers to 440 v. for plant use. Motors are all operated at this voltage at 3-phase, 60-cycle.

A well equipped shop, laboratory, bunk and boarding house complete the equipment of this company's operation.

Varieties and Occurrence of Feldspar

FELDSPAR, or "spar" as it is commonly called by miners, is a general name for a group of rock-forming minerals that vary somewhat in composition. The most important varieties from a commercial standpoint are orthoclase, or potash feldspar, and microcline, which has the same composition as orthoclase and differs only in crystal form; these varieties constitute the great bulk of the feldspar that finds commercial use. Albite, or soda feldspar, anorthite, or lime feldspar, and mixtures of these are used to some extent.

Feldspar forms a considerable part of such common and widespread igneous rocks as granites, in which it occurs in grains varying in size from that of a pinhead to ½ in. or more in diameter, says the United States Bureau of Mines, Department of Commerce, in a recently issued publication. Feldspar occurring in this way cannot be separated profitably from quartz, mica, hornblende and other associated minerals; therefore the ordinary granites and related rocks are not to be regarded as sources of commercial feldspar, the report states.

The feldspar of commerce is obtained from pegmatites which have qualitatively the composition of granite, but differ from granites in that they are of very coarse, irregular texture. Many single crystals have a diameter of 1 ft. or even several feet, and feldspar masses may be 20 or 30 ft. across. Pegmatites are generally regarded as having been formed after the consolidation of granite masses. Fluids containing the constituents of feldspar and quartz also carried water vapor and various volatile elements and bases, such as fluorine, boron, chlorine, phosphorus and sulphur. From the fluids were formed the characteristic pegmatite minerals such as muscovite, biotite, tourmaline, garnet and beryl. The fluids from which pegmatites were formed found their way along fractures or lines of weakness in the rocks already solidified, often following the intrusions of albites or finer grained pegmatite, which were replaced by great crystals and masses of quartz, feldspar (microcline) and other minerals, among the latter or which was albite. Pegmatites are found in schists, gneisses and other deeply buried rocks.

Centrifugal Concentration

EVERYONE who has had to do with the settlement of clay and the clarification of water has wondered why the principle of the cream separator could not be applied. It would save the great area now required for settling tanks and thickeners and the losses from evaporation that come from their use. But so far no attempt to use centrifugal force for either settling or concentration on a large scale has been successful in the rock products industry, although it is being successfully applied in other industries.

A discussion of centrifugal methods of concentration of ores is given in Technical Paper No. 457 of the U. S. Bureau of Mines, Department of Commerce. H. A. Doerner is the author. While it does not deal with the minerals with which the rock products industry is concerned, it gives formulas and a discussion of machines and methods that are applicable to all mineral substances. It is shown by these that the settling rate of any solid may be increased to any desired extent, even to several hundred times the rate of settling by gravity.

The actual testing work reported was on a heavy mineral Scheelite. But the conclusions drawn are of more interest than the tests. The author of the paper seems to believe that practically everything that may be done by gravity separation may be done by centrifugal force at greater speed. He gives a list of possibilities that tend to show this.

Georgia's Unique Road Material

THE state of Georgia is blessed with deposits of a road material of unusual qualities, according to B. P. McWhorter, asphalt engineer, State Highway Board of Georgia. In describing them and the use of the material in highway construction, in a paper read to the Asphalt Conference, of 1929, he says:

"In South Central and Southwest Georgia there are numerous deposits of iron oxide silica, and from past observations we believe this material makes the best base material for surface treating in the state outside of the lime rock bases. This material is characterized by high stability and makes an excellent wearing surface when not surface treated. It is affected least by water of any of the clay bonded type bases with the exception of the chert or top soil. The characteristics of the raw materials and quality of binder make it better than any of the bank run gravel deposits we have. The analysis of the following table shows that this soil contains 15.9% clay, 49.7% coarser than 60 mesh, 34% above 10 mesh and 28% above a 4 mesh.

"Deposits of this material are found on top of ridges or hills and run to a depth generally of 3 ft. from the top of the ground. The material is laid between forms generally 12 inches loose, which compacts to about 8½ inches. After thoroughly mixing the material to get a uniform product, the surface is machined generally with a 12-ft. blade until the true cross-section and crown is obtained. The characteritstics of this material is that it cements together very quickly; usually a couple of good rains are sufficient for a thorough bond. This is not true of sand, clay or gravel bases, which generally take a month or so to form their initial set.

"A base composed of 8 in. of iron oxide silica can be constructed for from $3000 to $4000 per mile, and a surface-treated top of the type we use for from $2000 to $2200 per mile, making a total investment of from $5000 to $6200 per mile. In my opinion there is no better investment a state can make than this type of construction on their secondary roads."

In conclusion he notes that such roads form an excellent base for converting the highway to one of the higher types.

Tunnel Blasting in Quarries*

When and How This Method Can Be Used Most Successfully

By S. R. Russell, C.E.
Technical Representative, E. I. du Pont de Nemours and Co., Inc.

UNDER certain conditions the coyote or tunnel method of blasting in quarries is the most economical. Where the rock is very hard and lies in columnar formation, as does most trap rock, and where the height of the face is sufficient, this method of blasting is ideal. Drilling in such a formation is expensive and yet all that is required to bring down a face of stone is movement. The stone breaks up well anyway, so that even though the explosives charges are confined to the bottom of the face, if sufficient is loaded to move the stone out, the fragmentation will be excellent. Besides, there is never any trouble from tight bottom, as there often is in this type of rock when well-drill holes are used.

Again, in hard rock, such as diabase and granite, even though of a massive formation, it is often very difficult to put down deep holes successfully. At the best, drilling is very expensive and not infrequently it proves impossible to drill holes to the grade desired. Hence, the tunnel method is more satisfactory, because, although perhaps it may not break up the upper layers so well, it gives assurance that the bottom will be blasted out and well broken.

A case in point is a large quarry in diabase, massive formation, which has an extremely high face, 150 ft. up to 280 ft. or more. For a number of years attempts were made to drill the full depth of the face, using 8-in. bits. When the holes could be drilled to grade or below, everything was all right, but very rarely was it possible to get two or more consecutive holes down, and the cost of drilling was so high that in case of failure to bottom a hole the operator could not afford to drill another alongside it. Usually the regular spacing would be taken for the next hole, and as often as not it would be impossible to drill that one to bottom, either. Thus, in shot after shot, great trouble was encountered with tight bottom, which caused much expense in redrilling, reblasting and low efficiency for power shovels.

Finally the difficulty was solved by using a coyote tunnel in the bottom and drilling well-drill holes part way down from the top. With a face of 250 ft. a T-shaped tunnel was driven at the base with an adit of 50 ft. and wings 75 to 100 ft. long. Well-drill holes were drilled 100 ft. deep. The cost per foot of drilling was considerably less because the first 100 ft. of hole can always be drilled much more cheaply than the second 100 ft. Moreover, a greater burden could be pulled. With the well-drill holes alone not more than a 40-ft. burden was ever taken, whereas with the combination of coyote tunnel and well-drill holes a 50-ft. burden was easily possible. Thus 25% more stone could be produced at considerably less initial cost and without after-griefs from unbroken bottom.

In limestone the arguments for tunnel blasting do not hold, as a rule. Limestone does not ordinarily break up through simply

*Reprinted from Explosives Service Bulletin, January, 1930.

A 90-ft. face of columnar trap rock admirably suited for tunnel blasting. The portal of the tunnel can be seen at base of the face

The blast with 8000 lb. of 40% dynamite

After the blast—45,000 tons of rock ready for the shovel

being moved out. It usually lies in defined heavy ledges with open seams which may be horizontal, vertical or irregular. Caves, too, are not uncommon in limestone formations Consequently, what is needed to insure good fragmentation of the rock is a proper distribution of explosives extending up the column of a drill hole. Moreover, as a usual thing, limestone can be drilled relatively cheaply. Therefore the tunnel method is not advantageous, unless the face is so very high that difficulty is experienced in keeping the drill holes in alignment, or unless there is an excessive toe, caused perhaps by a slide of the upper layers of the stone, and this is more in the nature of an emergency situation.

Limitations of the Single Tunnel Method

Going back to formations adapted to tunnel blasting, probably 150 ft. is about as high a face as should be attempted with one tunnel system. For faces higher than that it is better to use well-drill holes in combination with the tunnels or to use two tunnel systems. The latter scheme has been used with excellent results on very high faces, one system being driven about 100 ft. from the top of the face and the other at floor grade. In one large quarry in the East it is the practice to shoot the upper tunnels one year and the bottom tunnels the next year, keeping the upper part of the bank just one shot back of the lower.

It is possible to shoot higher faces than 150 ft. with one system of tunnels, but the objection is that the top of the bank usually drops down close to the wall. Oftentimes this sheer vertical drop causes the stone to wedge itself so that it is almost as tight as it was in its original position, and the cost of seam blasting, drilling and barring is out of proportion. Furthermore, the bank will be so high as to make it dangerous for the shovel and crew to work under it. Of course the tunnel can be loaded very heavily in the hope that the overload will cause the upper layers of rock to ride out with the lower layers, but this cannot be depended upon, especially if there are many seams in the formation. As a rule, when the face much exceeds 150 ft. in height it will be found cheaper either to drill the upper layers with a well drill or to use an upper system of tunnels.

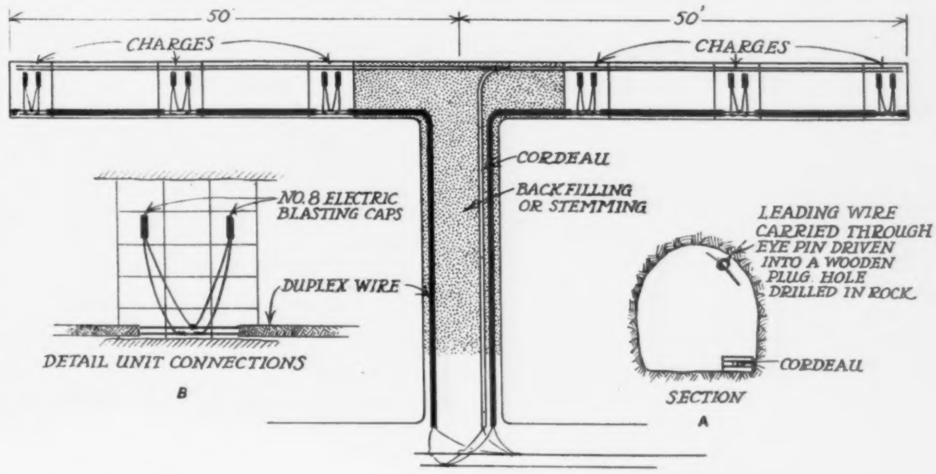
Loading a Tunnel Blast

Some believe it necessary in tunnel shooting to excavate recesses or sumps below the quarry floor in which to load the explosives. I have helped to load a great many tunnel blasts putting the charges on the floor grade, and there has never been any trouble afterward from failure to pull to grade. Tunnels usually are driven about 3½ ft. wide and 4 ft. high, and explosives charges are placed from 15 to 20 ft. apart in the wings. Large cartridges, as 5 in. by 16 in., are most convenient for loading, as they can be stacked in the tunnel just like cordwood.

For a number of years, back filling was always used between explosives units in the wings. Lately, however, this has been omitted in most of the tunnel shots with which I have assisted, and with equally as good results. Great care is taken, however, to pack stemming firmly from the first explosives units to right and left of the intersection of the adit and wings clear out to at least three-quarters of the length of the adit. Leaving out stemming between explosives units in the wings has been tried only when high explosives are used. With black blasting powder, probably back filling between units is advisable.

Detonating Systems for Tunnel Blasts

One of the most important operations in tunnel blasting is arranging the detonating system. I believe it best to use electric blasting caps and parallel connections, as in Fig. 1. Two or three primers made with No. 8 electric blasting caps are placed in each charge. Weatherproof duplex 14 gage copper wire should be strung through eye pins driven every 10 ft. along the spring line of the tunnel (Fig. 1-A). One cable should be strung from the portal clear to the end of the right wing, and another from the portal clear to the end of the left wing. If the tunnel has two or more pairs of wings, a separate cable should extend from the portal to the end of each wing. These cables are tapped at each explosives unit and the electric blasting caps in the unit are connected with the leading wires in parallel (Fig. 1-B). As no back filling is used, there is little chance of injury to the electric blasting cap wires, and as the leading wires are strung up where they cannot be trod upon,



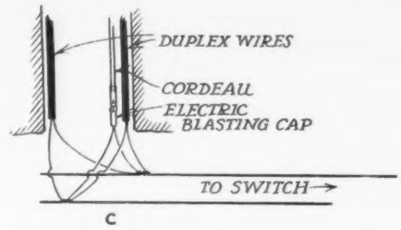


Fig. 1. Detonation system consisting of two electric blasting caps in each unit and cordeau running along the wings and extending out to the portal with caps and cordeau all connected in parallel

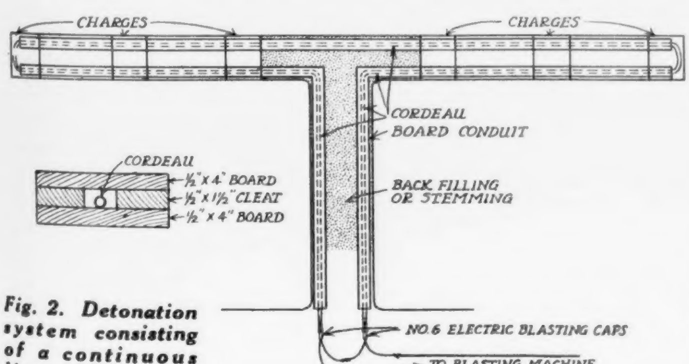


Fig. 2. Detonation system consisting of a continuous line of cordeau with electric blasting cap on each end connected in series

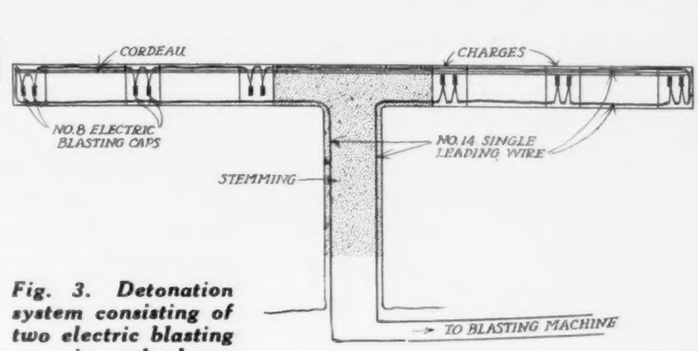


Fig. 3. Detonation system consisting of two electric blasting caps in each charge connected in series and a free line of cordeau running along the wings

this should give a reliable system of detonation.

Wiring Systems

However, it is well to use a line of cordeau also, extending the full length of the wings and clear out to the portal. One continuous line can be used from the portal to the end of one wing, with another line connected with this to extend to the other wing, as in Fig. 1; or two separate lines, one going from the portal to the left wing. This cordeau should be laid in a board conduit on the floor of the tunnel close to one rib to protect it from injury during loading and stemming (Fig. 1-A). When no back filling is used between units, these conduits need not extend beyond the first charge on each side of the intersection. In no case should the cordeau ever be strung through the same eye pins as the leading wire. (A very serious misfire occurred a year or so ago in a double T tunnel where this was done. Only the front line wings detonated, leaving 20,000 lb. of unexploded dynamite in the back wings.) Finally, an electric blasting cap is connected to the end of the cordeau at the portal and this is connected to the main leading wire to the switch in parallel with the duplex wires from the tunnel (Fig. 1-C). Of course, if two separate lines are used, an electric blasting cap must be attached to the end of each and both caps be connected in the circuit.

While having both the electric blasting caps and the cordeau affords a desirable protection against misfires, cordeau can be used alone to fire a tunnel blast. In this case, the line of cordeau should extend from the portal clear to the end of the right wing, loop back along the right wing to the end of the left wing, and loop back again through the left wing and out to the portal, thus making one continuous line, as in Fig. 2. Double-countered cordeau should be used and it should be laid in a board conduit all the way. When a single line of cordeau runs through all the charges it can be tested with the circuit tester from time to time as a check against breaks in the line.

Proper Connections Necessary

Naturally, parallel connections can be used only when a power current is available for firing. If the shot is to be fired with a blasting machine, only series connections can be used. In the latter case it is best to use a continuous single 12 or 14 gage copper wire with good waterproof insulation strung through eye pins along the spring line as before and looping back through the wings as described for cordeau. This wire must be cut at each charge and the two or more electric blasting caps in the charge connected in the circuit in series, as in Fig. 3. In addition a free line of cordeau should be run along the wings from charge to charge to assure detonation of all charges in case any of the electric blasting caps should misfire, as in Fig. 3 again.

Another way of connecting in series is to run an independent pair of wires from the portal to each charge unit. Each pair of wires can be short circuited at the portal and tagged to show the number and location of the charge. When the loading and tamping are finished these wires are untwisted and connected in one series circuit. This method of connecting requires much more wire than the others but it has the advantage that the circuit tester can be used on each pair of wires from time to time and any break in the wiring can be definitely located.

Whatever system of wiring is used, all connections should be tightly twisted and carefully taped. In fact, the necessity for careful and systematic procedure at every step in priming and connecting for tunnel blasts cannot be too strongly emphasized.

More Secondary Roads Wanted

SAM H. THOMPSON, president of the American Farm Bureau Federation, gave the Asphalt Conference at West Baden, Ind., some figures that show the need of more roads in the farming districts. Of the 6,750,000 farms in the United States, about 5,000,000, according to Mr. Thompson, are on dirt roads and 2,747,732 farms are on absolutely unimproved dirt roads.

The fact that so many farms are on roads that cannot be travelled at all times of the year entails many losses to the nation. If good roads existed in the farming districts motorized rural fire fighting companies could prevent some of the heavy losses from farm fires in which, according to the paper, 3,500 people are annually burned to death and $150,000,000 worth of property is destroyed.

Lack of educational facilities causes another grave economic loss. The centralized school house cannot be regularly utilized by those who live off surfaced highways, as was shown by a survey made by the U. S. Bureau of Public Roads. Medical care for the rural household is shown to average $7.63 per home call and 13% of the farms surveyed paid more than $15 per call. Road condition is said to be the main factor of this high cost.

Individual delivery of merchandise is shown to be uneconomic, for it is obviously cheaper for one truck to deliver to 50 farm homes than for 50 farmers to go to town for their goods. Lack of good roads causes losses to lines of commerce and business and to amusement enterprises such as moving picture shows.

A further reason, and a most important one, for more roads, given in the paper, is the appalling loss of life and property from the overcrowding of trunk lines.

The various farm organizations of the country have been studying the situation and propose an energetic campaign for more secondary roads. The paper says it is uneconomic to build trunk line roads without building feeders and the proponents will ask that so many miles of secondary road be built for every mile of trunk highway.

Among the resolutions adopted at the conference was one that asked that every legitimate effort be made to study and plan national and state improvement of the greatest possible mileage of farm to market roads and copies of the resolution were sent to the President, Congress and the governors and legislatures of all the states.

Specifications for Plastering

A SECTIONAL committee on specifications for plastering was organized on February 24 under the joint sponsorship of the American Institute of Architects and the American Society for Testing Materials. The sectional committee will function under the rules of procedure of the American Standards Association. It is intended that this committee shall develop specifications for lime, gypsum and cement plastering and will include representatives of the producers of plastering materials, the producers of materials to which plasters are applied and representatives of consumer interests and those responsible for the execution of the work.

The committee comprising representative members from various rock products associations and producers as well as others interested in plaster materials elected the following officers: Chairman, A. O. Lynas, building engineer, Dwight P. Robinson and Co., Inc., New York City; vice-chairman, LeRoy E. Kern, technical secretary, American Institute of Architects, Washington, D. C.; secretary, Frank B. Stevens, Jr., Stevens Master Specifications, Inc., Chicago, Ill.

Four working committees were appointed on lime plastering under the chairmanship of J. A. Murray; on gypsum plastering, under the chairmanship of H. J. Schwein, and on cement plastering, the personnel of which is still to be appointed, and a committee on metal lath under the chairmanship of Wharton Clay. There is, in addition, to be a co-ordinating committee which will receive the reports of the other committees and incorporate these into complete specifications for plastering. The co-ordinating committee will include in its personnel representatives of the other working committees and representatives of the architectural profession, specification writers, contractors and labor unions. The working committees have been instructed to have reports available not later than July 1 so as to make it possible to have complete specifications available in about six months from date. All of the committees have been instructed to keep in intimate touch with representatives throughout the country so that the specifications when developed will have nation-wide rather than local application. The work of this committee should be of utmost importance to the architectural profession and to the building owner.

Water Softening Plant at the Peerless White Lime Co.

An Efficient Automatic Operation Giving Steady Supply of Soft Water for the Boilers and Other Uses

By Ralph W. Smith
Director of Research, Peerless White Lime Co., Ste. Genevieve, Mo.

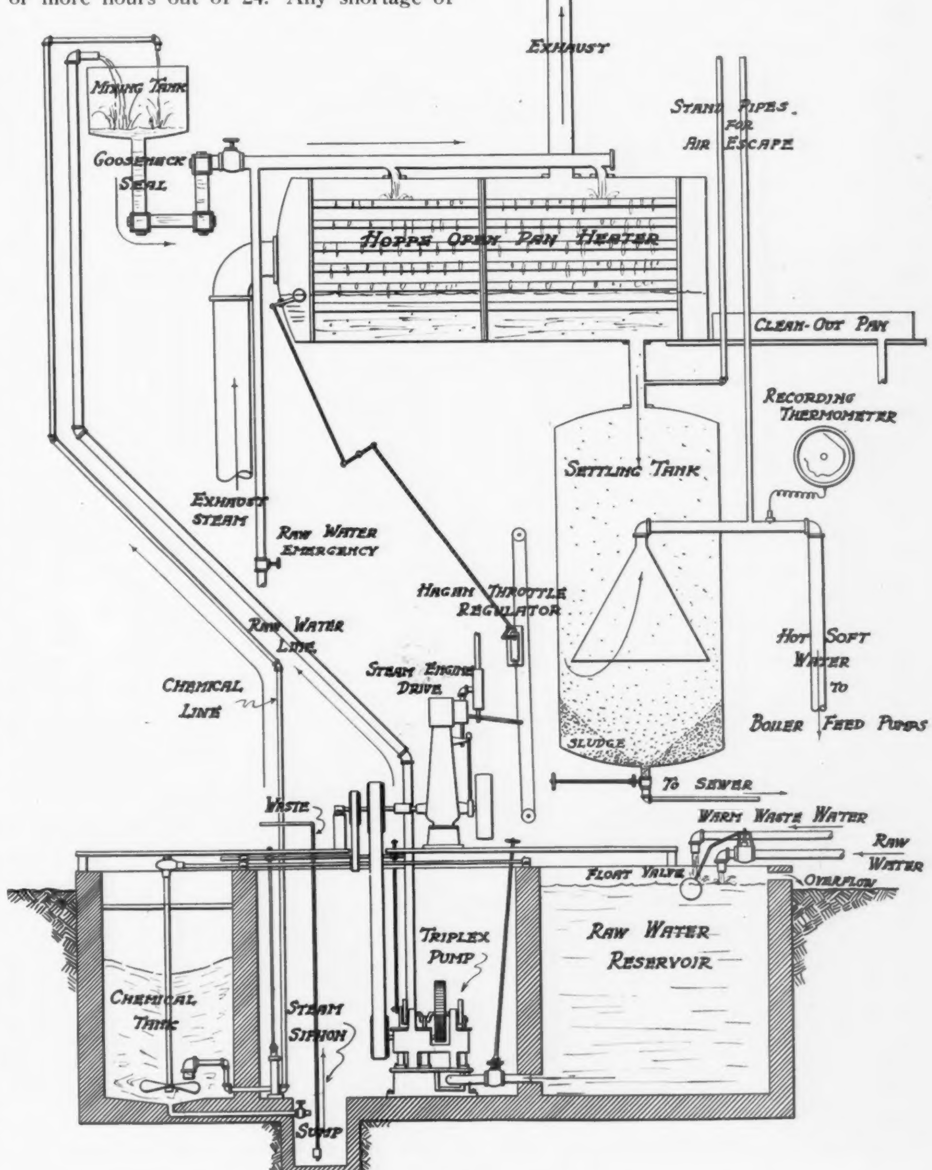
THE water softening plant which has been functioning for some time at the Peerless White Lime Co. of Ste. Genevieve, Mo. (a subsidiary of the Hunkins-Willis Lime and Cement Co., St. Louis, Mo.), has several interesting features. Designed and constructed by company engineers, its operation is entirely automatic. It requires a minimum of attention from the operator, a small amount of technical supervision and control from the company chemical laboratory, uses cheap chemicals, and delivers dependable quantities of uniformly softened water which is almost of the softness of distilled water.

Water Supply in Limestone

The water supply for the Peerless plant is drawn from a well which was drilled in limestone and is consequently a medium-hard water with a large proportion of dissolved carbonates or "temporary" hardness. Total hardness by the soap method (which gives results somewhat lower than more accurate methods), varies from 13.6 to 19.5 parts per 100,000 with the average at 16.2. There has been some speculation as to the cause of this variation and the most plausible theory is that the iron casing at the top of the well is not sealed where it rests on the solid formation and the pump suction draws some water from circulating ground water on top of the rock, especially during rainy season. At this contact between casing and drill hole is at some depth below the surface and in a location where there is considerable surface water, it would be a difficult and expensive undertaking to seal the joint. That there is leakage at this point, however, is strongly indicated by the fact that after a heavy rain, the well water hardness has dropped as low as 13.5 pts. per 100,000.

In addition to securing satisfactory boiler water, one of the main functions of the installation was to reclaim the considerable amount of recoverable waste water that is always present around an industrial plant. Waste water recovery calls for a collection sump and this is the full explanation of the raw water reservoir, triplex pump, and automatic drive shown in the drawing. Were it not for waste water recovery, the reservoir, pump, and automatic drive could be eliminated and raw water from plant pressure tank could be fed directly to the heater with a chemical proportioning device.

The two principal sources of waste water at the Peerless plant are, cooling water from the Woods automatic gas producer and cooling water from the mine and quarry air compressor. These are collected in the raw water reservoir as shown and are sufficient in quantity for the boiler supply during 16 or more hours out of 24. Any shortage of water during peak load or other time is supplied automatically by the float valve on pressure line from raw water storage tank. Not only is the waste water recovered but



Details of the chemical water softening plant at the Peerless White Lime Co., Ste. Genevieve, Mo.

also some heat. Average temperature of cooling water from the gas producer is 94 deg. F., from the air compressor, 82 deg. F., raw water, 62 deg. F., and the mixture in the reservoir ranges from 76 to 86 deg. F. This conservation of heat is not a factor during constant heavy power house load when there is sufficient exhaust steam to heat boiler house load to boiling point, but is a direct saving of fuel during light load or heavy withdrawal of water for boiler feed when there is a tendency for temperature of boiler feed water to fall below boiling point.

The Softening Treatment

Water from the reservoir enters a Worthington 4 by 6 belt driven triplex pump at bottom of pit as shown, thereby keeping pump under constant prime. Raw water from pump is discharged into small mixing tank located slightly above the heater, where chemical mix is added. It is quite essential that the raw water and chemical is thoroughly mixed before entering the heater and the arrangement shown accomplishes this. As there is a slight back pressure in the heater from exhaust steam, the goose neck seal is necessary to keep steam from blowing through the mixing tank. Crosses with plugs are used at the turns so that pipe line can be easily opened for cleaning. This is necessary because chemical reaction and precipitation of sludge begins as soon as chemical is added to raw water. The valve and raw water line next to the goose neck is for emergency purposes in case of a break down of water softening apparatus.

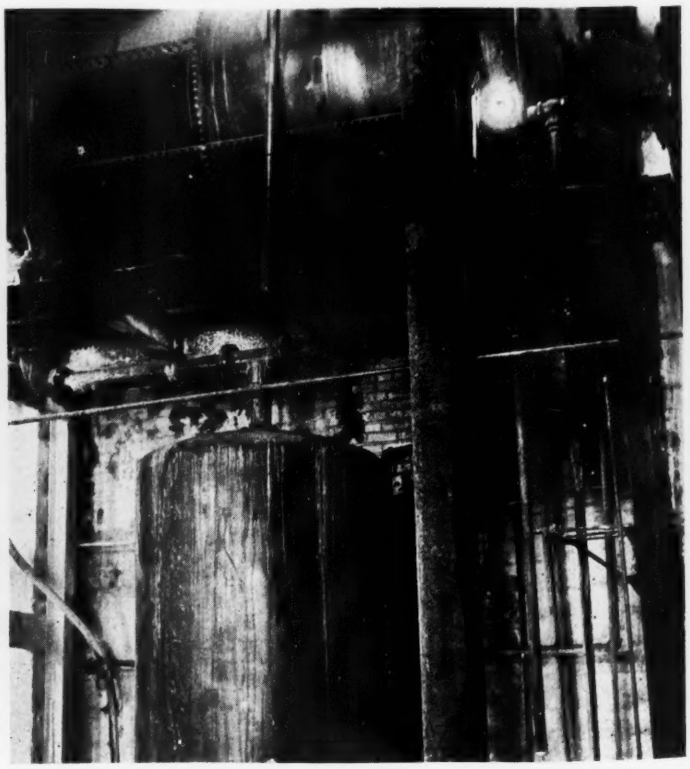
Chemicalized water now flows to a Hoppe open pan heater where it is brought to boiling point by waste steam. A time element is involved in its passage through the multiple pans of this unit which in connection with the heat, allows the complete chemical reaction to proceed and consequent precipitation of solids, 75% of which are retained in the pans. The retention of solids in these pans, however, rapidly reduces the settling capacity of the heater so it is necessary to interpose a settling tank between heater and boiler feed pumps.

This settling tank captures practically everything that escapes the pans and the resultant product is a soft, comparatively clear water for the pumps. Sludge is drained from the settling tank twice daily. The open pan heater is given a thorough cleaning every two weeks and is usually found about 60% full. The heater washing requires about three hours. It was found necessary to add the stand pipes shown on the settling tank to prevent formation of air pockets. Except during peak withdrawal of water under light load (which is only occasional and for short periods) temperature of treated water as it enters boiler is about 206 deg. F., just a few degrees below boiling at Ste. Genevieve. Daily 24-hr. charts of temperature are made on a recording thermometer.

Automatic Features

Among other satisfactory features of the plant is its automatic operation and lack of necessity for close attention. This is accomplished by the Hagen throttle regulator which operates from a float valve on the heater and acts on the steam throttle to the engine drive As boiler feed pumps draw down the water level in heater, the engine speeds up and water supply is increased. To secure proper chemical proportioning to a varied flow of water, the chemical pump is direct connected to the triplex pump by a crank arm attached to the pump crank; thus the chemical pump is always in step with the water pump and exact proportioning is assured. An agitator in the chemical tank is also connected to engine drive so that one prime mover actuates the entire plant. The agitator speed is such that sufficient agitation is secured at slowest speed of triplex pump. This necessarily causes some excess agitation during heavier water withdrawal but the agitator load on engine is negligible. Sufficient agitation at slow speed during light load is very necessary in order to prevent settling of chemicals in tank and resultant upset of chemical calculations. The chemical mix is partially a solution and partially solids in suspension and the nature of the combined mix is such as to cause fairly rapid settling of solids. Thus if agitation is insufficient during the night load, the chemical pump would withdraw the more highly concentrated settled portion of chemical tank and leave the dilute portion for day, and chemical mix would be out of balance both day and night. This could be eliminated by a separate drive, constant speed, but cost of additional motor did not seem to be justified over present method. The small sump and steam siphon are quite necessary at times for cleaning chemical

Throttle regulator on the steam engine drive allows automatic operation. The water reservoir and pump pits are below the platform



Chemicalized water is heated in the open pan unit. The settling tanks below capture everything escaping the pans, thus permitting a clear soft water for the pumps

tank or removing accumulation of leakage from pump.

The chemical pump is located in a pit where it can be worked on or adjusted easily and is under constant prime. The goose neck suction line is expanded from 1 in. to 3 in. at intake and all chemical must rise vertically through this 3-in. nipple. This prevents small particles of grit from entering the line and getting on the seats of the check valves. This was found quite necessary in order to insure constant and dependable operation of the pump.

The chemical calculations involved in obtaining the proper chemical mix are based almost entirely on procedure offered by the National Lime Association some years ago ("Lime Soda-Ash Process," by L. B. Burt and P. C. Laux) and are not difficult to make. The pump proportions of the chemical pump to the triplex must first be calculated and at this plant it is 1 to 49. Since 1 ft. of depth in the chemical tank is 180 gal., this depth is approximately equal to 9000 gal. of water to the boiler feed pumps.

Hardness Reduced to a Minimum

The temporary and permanent hardness of raw water must be obtained by accurate methods. The temporary hardness in parts per 100,000 multiplied by 0.072, plus the permanent hardness multiplied by 0.075, equals pounds hydrated lime required to soften 1000 gal. of water. The permanent hardness multiplied by 0.09 equals pounds soda ash required for 1000 gal. of water. Both figures translated to 1 ft. of depth in the plant chemical tank (9000 gal.) equals 17 lb. hydrate and 5 lb. soda ash. To this is added ¼ lb. of liquid sodium aluminate per 1000 gal. of feed water (or 2¼ lb. per ft. of chemical tank). Liquid sodium aluminate is furnished in convenient 50 gal. drums by a manufacturer. Thus the final chemical dosage per ft. of chemical tank is 17 lb. hydrated lime, 5 lb. soda-ash, 2¼ lb. liquid sodium aluminate. The only variation from this over a period of a year has been in the hydrate which has been corrected by ½ lb. changes from time to time and has ranged from 15 to 18 lb. per ft.

A daily water sample is taken at boiler feed pump and tested for total hardness, alkalinity and caustic alkalinity. The complete test requires about 10 minutes and gives a daily check on water softener operation. It is quite essential that the feed water be slightly alkaline and it must also have slight caustic alkalinity, i. e., twice the phenolphthalein reading should be slightly greater than the methyl orange reading. This excludes the possibility of dissolved oxygen corroding the inner surfaces of boiler or tubes. With this treatment, at the Peerless plant, feed water has averaged about 0.2 parts per 100,000 total hardness for the past six months and lately is at the low figure of 0.05 parts per 100,000.

Economies Derived from Installation

Before the softener was installed it was necessary to wash the Sterling boiler and turbine the tubes every three weeks, and there was frequently a scale of ⅜ to ½ in. thickness on the tubes. The tubes were occasionally burned out. With the softener in operation the boiler is used from 8 to 10 weeks and is then taken down principally for inspection and repairs in the fire box because of forcing the boiler with overload. Little or no scale is found on the tubes and old scale in the drums is gradually coming loose in large pieces. No tubes have been lost, steam is raised and held easier and less coal is consumed. This last is an important item as tests by the Univerity of Illinois indicate that a scale of 1/32 to 1/16 of an inch causes a fuel loss of 7 to 12%.

Lime for Potatoes

THE once serious objection towards the liming of potato-growing soils, has been largely removed by the intelligent control of this fertilizing agent, states J. G. Lipman, one of the foremost agronomists, in a recent article appearing in the *American Fertilizer*. Earlier use of lime indicated that it encouraged development of potato scab but constant research has showed that lime correction of these soils yields excellent crops without serious loss through scabbing. But lime should be used only with sound advice concerning the amount and kind, method, time of application, etc., the article continues.

Quoting Dr. Lipman:

"Since different forms of lime are the most economical and satisfactory means for correcting soil acidity, the lime problem is not a local one any more than soil acidity is a local problem. In some countries it is now a very pressing problem. For instance, Schurig, one of the leading German agronomists, claims that the lime problem in Germany is one of the major—if not the major—economic question in German agriculture. In 1928 the increased consumption over the preceding year was about 100,000 tons of ground limestone and 60,000 tons of burned lime. But this increase in consumption is still very much short of the amounts required to put the soils in that country in the best growing condition. The lack of lime is being increasingly felt in the corn belt soils in the United States. The same may be said to be true of tobacco and cotton, where root rots and other injury caused by soil fungi is becoming more prevalent. The agronomy department of the New Jersey Station has demonstrated that, even in the case of creeping bent grasses used for lawns and putting greens, the use of acid-producing fertilizers has already created excessive soil acidity to the detriment of these grasses.

"From the potato grower's standpoint, lime is important, not merely because it affects yields, but also quality. A number of German investigators report that the use of lime on acid soils increases the yield and leads to the production of tubers with a higher percentage of starch. The color and cooking qualities of these were improved. Schurig, who was already quoted, says that he prefers to use 500 to 600 lb. per acre annually rather than larger amounts at less frequent intervals. He and others claim that, when lime is applied between the middle of May and the first of June over the potato field when the plants are about four inches high, damage from scab is not evident. On the other hand, there is a much improved growth. They admit, however, that this practice results in the appearance of scab in the following year if potatoes are grown on the same field. However, one should bear in mind the fact that in European countries potato scab is much less troublesome than it is in the eastern United States. It may be noted, further, that the effect of lime as it relates to potato scab will vary with the season and soil type. On heavier soils a given quantity of lime would be less likely to encourage the development of scab than it would n lighter soils. This is more or less true of certain sweet potato diseases. Bulletin No. 311, recently published by the Maryland Station, contains, among other references, one which has to do with the effect of lime on sweet potatoes. The author says:

"'The sweet potato is fairly tolerant to acid conditions, and excess lime lowers the quality of the roots. On the other hand, with extremely acid soil conditions, and particularly in soil rather low in plant nutrients, lime increases the yield."

"Some interesting results are reported by Hartmann in a German publication recently published in Berlin. He states that in a loamy soil with a pH of 7, the starch content of potatoes was increased from 18.2% where no lime was applied to 21.6% where burned lime was used. In another soil, which was also a loamy sand, with a pH of 6.5, the starch content was similarly increased from 16.2 to 17.2 and in a third soil, with a pH of 4.5, the starch content was increased from 16.6 to 18.4. He found, further, that the tubers with a higher starch content contained a smaller percentage of water and a higher nitrogen content. He believes also that the potatoes from the limed plats had a tougher skin and the flesh was more firm.

"In so far as lime is a factor in improving the texture and structure of the soil and in favoring the circulation of air and water, let us use it accordingly. When chemical tests show that our soil has become excessively acid, let us obtain sound advice concerning the kinds and amounts of lime to use and the method and time of application. It should be emphasized here again that the soil type, the season and the character of the fertilizer employed will materially influence liming for potatoes."

Small But Efficient Gravel Plant

The Samuel Hensel Operation at New Philadelphia, Ohio

THE sand and gravel washing and screening plant put into operation by Samuel Hensel, New Philadelphia, Ohio, early in the 1928 operating season, took the place of a smaller plant which Mr. Hensel had used for a number of years. Production is about 400 tons daily, an increase of around 50% over the old plant.

A deposit of 23 acres of land adjacent to the old pit, covered with a topsoil averaging about 2 ft. thick, has been tested to a depth of over 100 ft., all in good gravel, indicates a supply for many years of operation at the present rate.

Excavation

The material is being taken out with a ¾-cu. yd. Sauerman slackline cableway excavator, working on a span of 600 ft. This installation includes an 80-ft. Sauerman steel mast and roller bearing mast-top blocks, and a Sauerman two-speed electric cableway hoist.

The sand and gravel is discharged from the cableway bucket to a grizzly over a hopper at the top of the plant, and is fed from the hopper by means of a 20-in. by 60-in. Toepfer apron feeder to a 40-in. by 20-ft. Toepfer revolving screen. This screen has a scrubber section, two screening sections for gravel and a sand jacket.

Coarse gravel and small or pea gravel are spouted directly to bins; oversize passes out the end of the screen and is chuted to a bin beside the plant. When this bin becomes full the oversize is crushed and returned to the screen. The jaw crusher, a No. 818 Universal, rests on a concrete foundation beside the plant and under the oversize bin. A bucket elevator 60 ft. on centers delivers the crushed material to a spout which returns it to the revolving screen above the plant bins.

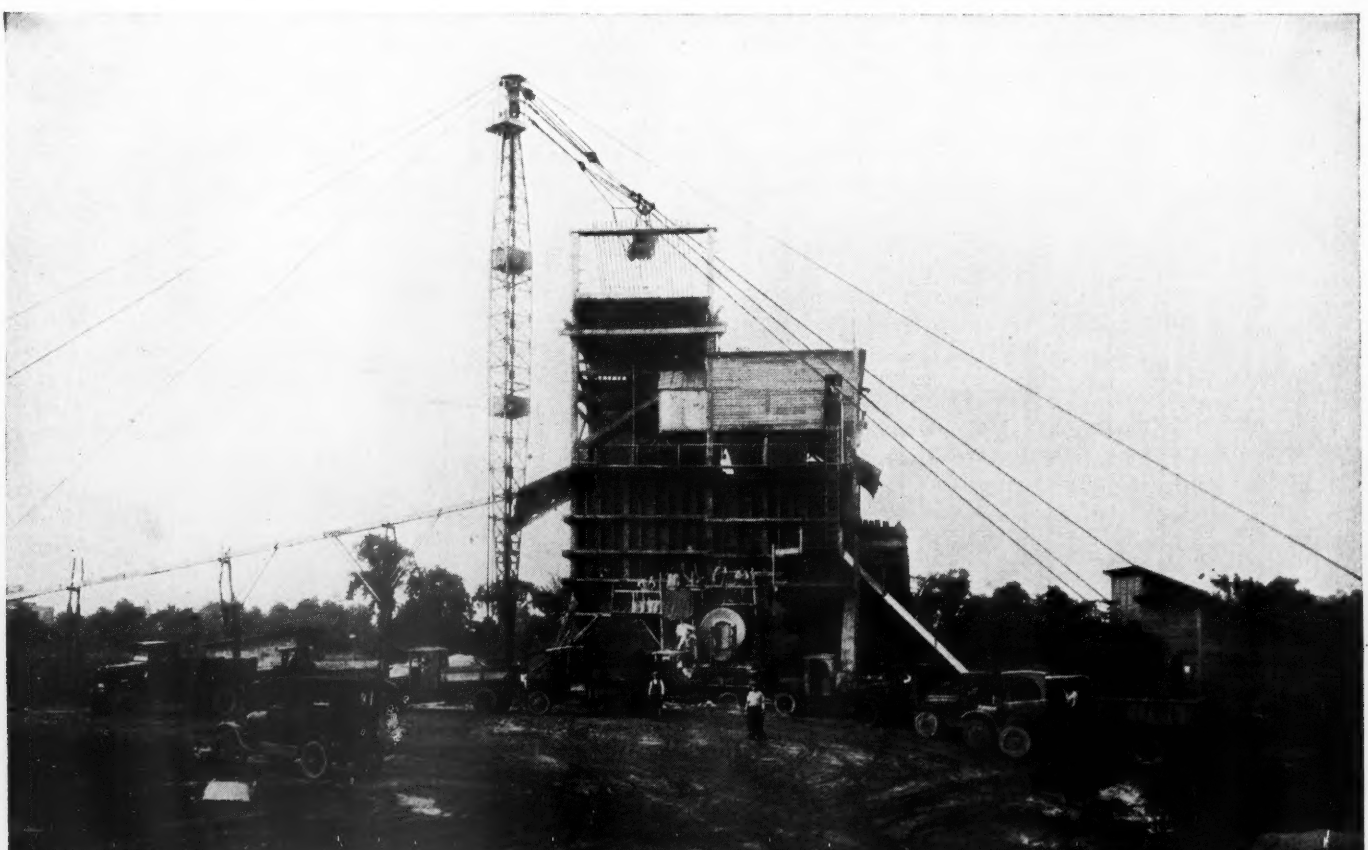
The sand passes through the sand jacket with the wash water and is graded in two automatic conical settling tanks into coarse and fine sizes. Waste water is flumed away, the two grades of sand passing to their respective plant storage bins.

An interesting feature in the construction of this plant is the use of concrete piers with 15-in. I-beams 42 ft. long carrying the load between the piers. This was made necessary by the 20-ft. span between the piers, which prohibited the use of wood. The piers are supported on concrete foundations, and are 18 ft. long at the top and 20 ft. long at the bottom. The two end piers taper in thickness from 2 ft. at the bottom to 1 ft. 6 in. at the top, and the central pier tapers from 3 ft. 6 in. at the bottom to the same thickness of 1 ft. 6 in. at the top.

Loading

There is 14 ft. clearance between the I-beams and the concrete roadway. This has been satisfactory, permitting this producer to hang batch meters on the bottom of the bins. It has also made it possible to mount a concrete mixer beside the plant low enough to receive aggregates direct from the bins and yet high enough to discharge concrete into trucks.

The plant is illuminated for night operation, and is operated throughout by electric motors. A 60-hp. motor is provided with the cableway hoist. The revolving screen and the apron feeder are belt driven from a 20-hp. motor mounted on the screen platform. A 7½-hp. motor mounted in the plant at the level of the screen platform transmits power by means of belts and pulleys to the head sprocket of the bucket elevator for the return of crushed material. The crusher is belt driven from a 20-hp. motor.



Cableway-equipped sand and gravel plant of Samuel Hensel at New Philadelphia, Ohio, producing 400 tons daily

All stairs and platforms are provided with 2 by 4 safety railings.

The Hensel plant was designed and all equipment furnished by the Day and Maddock Co. of Cleveland.

On Ethical Business Practices

THE EDITOR—Like you, I think it is true that the present attitude of the Federal Trade Commission toward efforts made by business to clean up the premises is wholesome; but for the life of me I cannot understand how intelligent thinking will lead any man to believe that a conference with the Federal Trade Commission will cause a competitor to do anything that the competitor might be unwilling to do in a particular case or at a stated time—case and time having reference here to a specific opportunity to obtain business.

And, after all, that's the hope, or objective; is it not? If not, then why all the talk about ethics and trade conferences? A stated trade practice—and it may not be a practice at all, but merely an isolated act—is either fair or unfair, honorable or dishonorable, profitable or unprofitable, depending much of the time upon how it is viewed by the fellow who does not get the business.

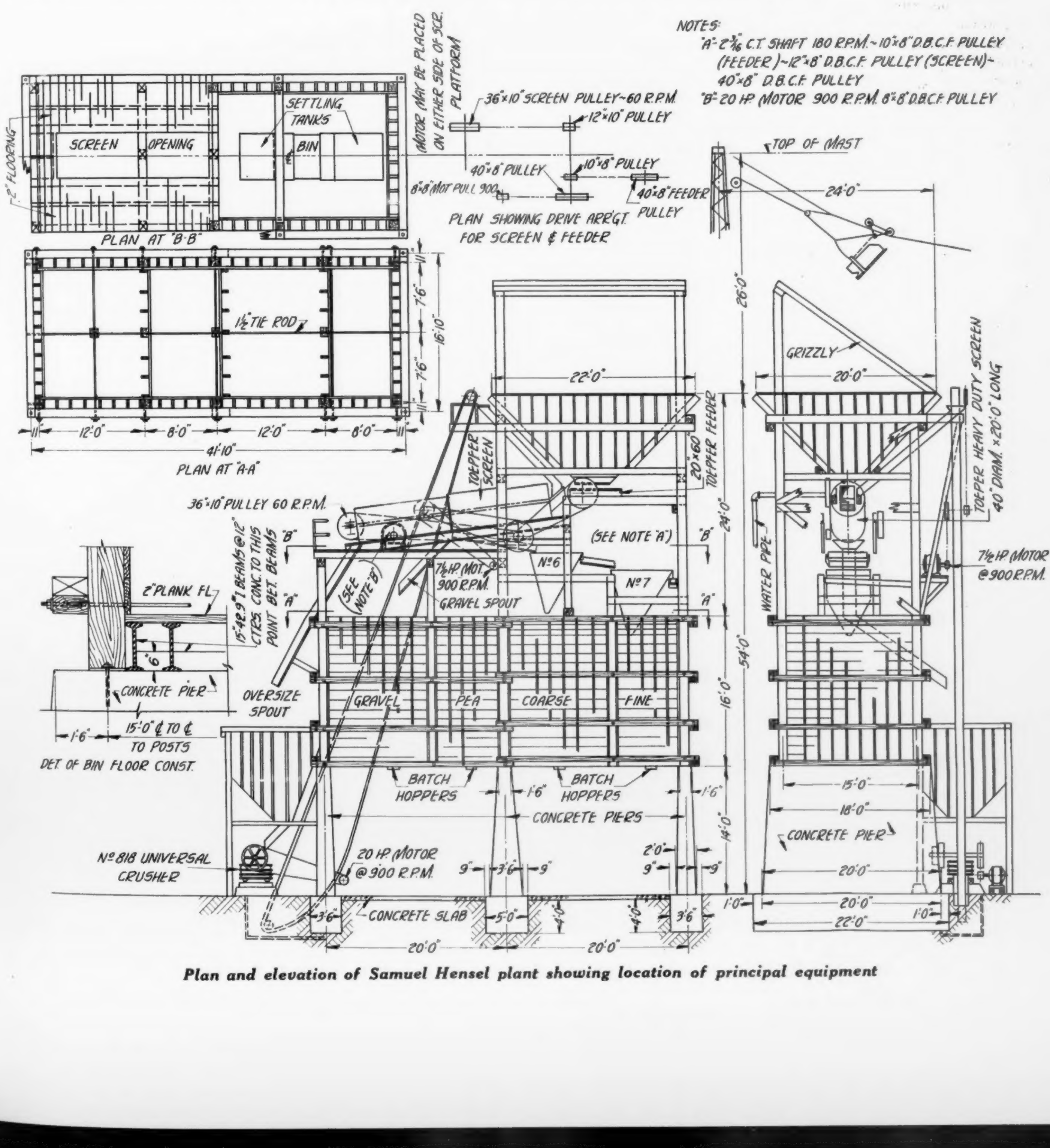
Selling below cost is universally condemned and is undoubtedly injurious to competitors, regardless of purpose or intent. Indulged in to a point of practice, it is most certainly injurious to all concerned; but the "bug" in most proposals to stop "dumping" is that all too often complainants are not nearly so much concerned about the actual cost of goods "dumped" as they would make believe. The real aim is to restrict market boundaries, or control production.

Cecil Rhodes wrote the finest code of business ethics I have ever seen, namely: "A transaction that does not benefit both parties benefits neither." I respectfully submit that no one whose business practices or policies are founded on this principle needs aid from the Federal Trade Commission.

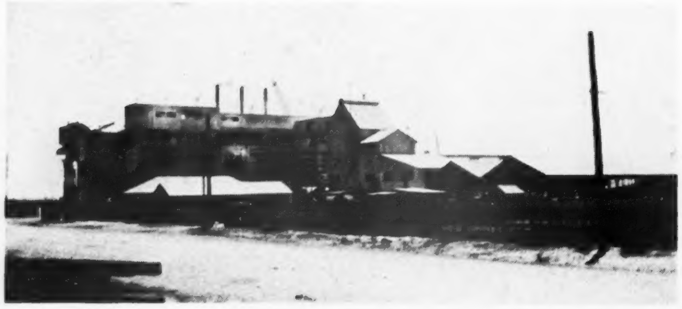
BEN STONE,
The Merom Gravel Co.
Indianapolis, Ind., Feb. 22, 1930.

First Hydrated Lime Plant in the Maritime Provinces

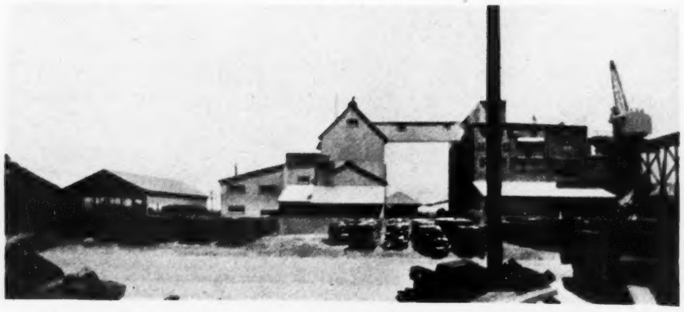
A BRIEF news article in ROCK PRODUCTS, January 18, 1930, referred to a hydrate mill built in 1928 by the Snow Flake Lime, Ltd., St. John, N. B., as the first in the Maritime Provinces. This was not strictly accurate, for the Eastern Lime Co., Ltd., Windsor, N. S., built and operated a plant four years prior to 1928. This plant was destroyed by fire in 1927, but rebuilt in February, 1928. H. C. Burchell is the manager of this plant.



Plan and elevation of Samuel Hensel plant showing location of principal equipment



General view of the Victor Electric Plaster Mills, Ltd., plant at South Melbourne, Australia



The mill building is at the right, mixing and tile plant, center, and the tile drying sheds are at the left

Australian Gypsum Products Industry

Remarkable Growth and Development Since the World War

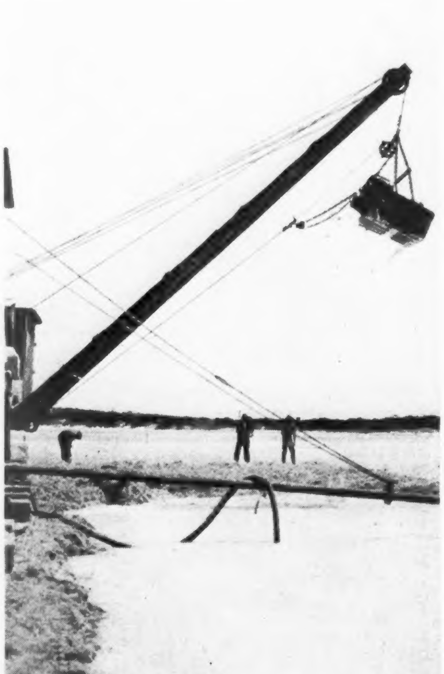
THE ARTICLE on "Australian Gypsum Wallboard," in Rock Products, December 7, 1929, describing some very handsome and unusual samples of gypsum wallboard received from a manufacturer in West Australia, the Ajax Plaster Co., Ltd., was somewhat misleading in one or two details, according to another good friend and subscriber of Rock Products, George H. Limb, managing director of the Victor Electric Plaster Mills Pty., Ltd., South Melbourne, Victoria, Australia.

Well Established Gypsum Industry in Eastern Australia

The December 7 article stated that: "So far gypsum tile has never been manufactured in Australia, nor has wallboard or plaster board of the type we know here in the United States." It seems that while this is probably true of West Australia, in the eastern states there is a well established gypsum products industry, although a relatively youthful one. There are two active associations of producers, the Australian Plaster Millers' Association and the Victorian Fibrous Plaster Manufacturer's Association. These two associations had a combined exhibit at the All-Australian Exhibition, September-October-November 1929. The following paragraphs are taken from a booklet published by the two associations on "Fibrous Plaster—Its History and Use in Australia":

"Before the war the bulk of the plaster used in Australia was obtained from abroad—principally from Germany, a small quantity coming from America. Although some knowledge existed of the immense deposits of gypsum which existed in South Australia, and to a considerably less degree elsewhere, the problem of converting it into plaster suitable for commercial purposes was unsolved. Foreign supplies having, in consequence of the war, ceased with the disorganization of shipping, and in the case of Germany with its cessation, a stimulus was given to the work of research in the development particularly of the gypsum deposits in South Australia. After the expenditure of a considerable amount of money and of painstaking scientific investigation, complete success was achieved. The result is that Australia is now independent of foreign supplies of plaster.

"What the development of the industry has meant to the Commonwealth may be gaged from the fact that whereas before the war 20,000 tons of plaster was imported, the amount that is now received is negligible. Moreover, its popularity has so expanded that production in Australia has reached the high-water mark of 60,000 tons a year. A new industry has been created, in which public requirements are being met in the most complete and satisfactory manner at a reasonable cost, and employment is being given in the plaster mills to 600 persons, and in the manufacture of fibrous plaster products, 7000 persons. Benefits incidental to the successful prosecution of the industry are derived by the interstate shipping and railway services, the gypsum deposits being situated at Marion Bay, Inniston, and Trevanard, on the south coast of South Australia.



Dragline excavating gypsum from the under water deposits

Independent of Imported Gypsum

"Necessarily large capital has had to be employed in the development of the industry, and it is estimated that this has occasioned an expenditure of £1,000,000. Enterprise is, however, being rewarded, while the wealth of the country has been substantially increased. Coincident with this enormous development of Australian gypsum products has been the remarkable growth in the number and size of factories devoted to the manufacture of fibrous plaster, while the milling of hardwood plaster, as well as hard finish and sanded combinations of gypsum, has enabled builders to be independent of foreign supplies of these materials."

There are five large gypsum products manufacturers in East Australia, the largest perhaps being the Victor company, in regard to which Mr. Limb has furnished us the following information:

"Apart from the 60,000 tons used in the manufacture of wallboard, my company has an ever increasing output of wall plasters, partition tile, sanded plaster, etc., etc., our capacity being 200 tons daily. All the wallboard manufactured here is hand-made, although there is a machine being developed at the present time which may or may not be successful. The price in the Eastern States for wallboard ranges from 1/6 to 1/9 (36c. to 42c.) per sq. yd.

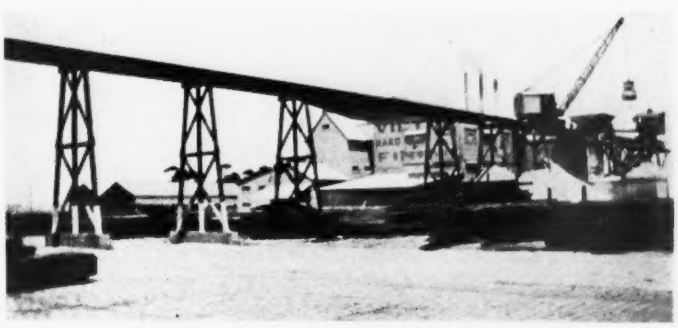
"I appreciate your remarks on the quality of the board, which in my opinion is far superior to the American article both in strength and beauty. The climatic condi-

tions here call for a smooth white finish on about 90% of our jobs, so a board after the style of the American one would not be very popular compared with that at present supplied. Practically all frame houses here now are built, walls and ceilings with fibrous plaster, each wall being made in one sheet thus eliminating all joints and the necessity of wooden or plaster cover molds. This makes a very neat, strong and pleasing job, the ceilings usually being divided into plain panels or relieved with one or more ornamental panels giving a most artistic finish to the room.

"The plaster supplied to wallboard makers requires neither accelerator nor retarder to be added by the maker, as it leaves the mills specially prepared for that work.

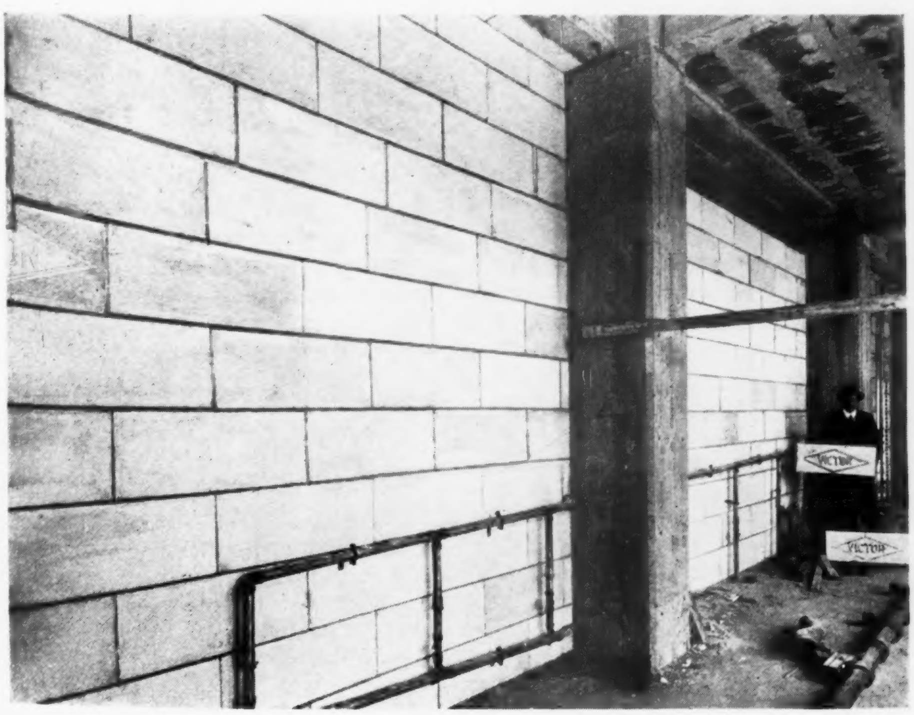
"The gypsum deposits owned by my company are situated about 500 miles west of Melbourne on the coast, and transport of crushed and washed gypsum is made by small steamers to the plaster plant, which is also on the waterfront at Melbourne. The gypsum is exceptionally pure, analyzing 99%. The excavating is done with a Bucyrus dragline from under the water as shown in the accompanying view; after the gypsum is thoroughly loosened by shooting, it is dumped into a hopper over a portable crushing and washing plant, which screens out all fines and discharges these back into working. This plant is towed along by the Bucyrus dragline as it travels along face. The object of taking out fines is to save freight on the excess moisture carried in the fines and to leave the gypsum free and easy to handle. The gypsum deposit varies in thickness from 3 to 7 ft. The washer dumps the clean coarse gypsum into piles which are afterwards scooped up and loaded into 5-ton side-tipping trucks, to be hauled over a tram track of three miles by Vulcan locomotives to the end of our private jetty, which is nearly half a mile long, and then dumped on to belt conveyor that discharges into the ship's hold. We load in this way 1000 tons in 14 hours every five or six days.

The crude gypsum is dumped into this moveable crushing and washing plant where the fines are removed



Gypsum is reclaimed from stockpiles by the crane and loaded to cars on the overhead track

The crane and truck going out to discharge a boat load of gypsum at the Melbourne wharf



A wall of "Victor" gypsum tile

"On arrival of the steamer at Melbourne she ties up at our wharf opposite the plant and is discharged by an electric locomotive grab crane on a gantry, which fills a 30-ton truck attached by a pole to a crane at the correct distance to enable the grab to fill the truck without altering the jib radius. When this truck is filled it is pushed by the crane across the gantry to the plant, and dumped through a gate in the truck bottom, either into a bin over the dryer or to yard storage. The same crane reclaims from yard storage to dryer.

"After the gypsum is dried it is fed to a

bin over a pulverizer, then to the kettle bins; we have three 9-ft. kettles which discharge, each batch, about 8 tons of calcined gypsum into the hot pits. These are hoppered on all sides to a small screw feeder which discharges into a 12-in. screw conveyor in tunnel under the hot-pits. This conveyor discharges into an elevator which delivers the hot material to a bin over a second pulverizer, where the whole is reground. From here it is conveyed to large bins over two packers (Bates) packing into 150-lb. jute bags which are then thrown from packer tubes on to a belt conveyor running through doorway to motor trucks and wagons for delivery to wallboard plants or buildings throughout the city and suburbs. The same arrangement is also used for loading into railway trucks and interstate boats.

"For making up our wall plaster and special lines we have a ½-ton Broughton mixer, which is fed from a spout through one of the plaster storage bins and discharged to another packer on the ground floor, where the finished product is also loaded by the same means as the plaster.

"For our tile machine and sand plaster plants, the flow of plaster to storage bins is intercepted by a cross screw conveyor and carried above the roadway between plants to bins over the mixer and soak belt.

"The whole of the main structure has been constructed of concrete, enabling us to utilize all the space in the building not taken up by machinery and walkways for storage bins, the result being, we have over 1200 tons of gypsum in various stages of manufacture stored in these bins which form a part of the building.

"The open gypsum storage shown in the photographs has a capacity of 5000 tons."

Some Things Trade Associations Cannot Do Yet

TRADE ASSOCIATIONS, by observing the "rules of the road," can contribute materially to the promotion of better management in business, declared Dr. Hugh P. Baker, manager of the Trade Association Department of the Chamber of Commerce of the United States in an address before the National Management Congress held in Chicago, Ill., March 3.

The rules under which trade associations can operate most effectively, he said, have been rather generally defined today.

"Under our anti-trust legislation, made up of the Sherman Act, the Clayton Act and the Organic Act of the Federal Trade Commission," Dr. Baker explained, "there are three rules in particular which must be observed. Business men in their associations or out, so far as that is concerned, cannot get together and agree as to the price of their commodity or service. If we were to examine critically agreements for price fixing which have in the past been declared by the courts to be illegal, it would seem more than evident that it is not only illegal to fix prices but it is uneconomic and it never works for any length of time. Members of an association cannot agree to restrict production nor can they allocate or divide sales territory. These three rules must be observed by associations both in letter and spirit.

"There are then other rules which must be observed as certain association activities are carried on. If a trade association is operating a credit bureau it cannot set up a black list and distribute it promiscuously. If it is developing uniform cost procedure among its membership, an activity of very great importance, the members cannot agree as to the average cost of their commodity or service. If the association is developing facts as to the industry and presenting these facts in statistical form, whch again is one of the most constructive things that can be carried on by an association, it must be careful to give these facts out as facts and not attempt to interpret their meaning for the membership. While the average association is much more concerned with what it can do rather than with what it cannot do, nevertheless the rules of the road which the association must travel should be most carefully observed."

Development of Glass Sands of the Pacific Coast

ALTHOUGH a number of fairly pure deposits of glass sand exist on the Pacific Coast, these are at present being used only for the making of brown or amber glass, the United States Bureau of Mines, Department of Commerce, points out. For white glass, sand is still being imported, mostly from Belgium. An iron content of 0.2% or 0.3% prevents the direct use of the domestic sand for white glass, but a number of commercial organizations are attempting to work out methods of beneficiation of local materials.

The native sands, according to the Bureau's Pacific Experiment Station, Berkeley, Calif., are of two sorts; white beach sands, such as those at Monterey, and loosely cemented sands of a very old geologic period, occurring usually in the foothill regions. The beach sands contain as impurities magnetite, titanium oxides, and micaceous materials, and the numerous attempts to purify this material by electromagnetic and electrostatic concentration methods have so far had but little success. The agglomerated sands, however, contain only small amounts of iron and alumina as impurities, and these impurities exist as a sugary coating upon otherwise relatively pure silica grains. A simple washing and screening process serves to improve considerably the grade of the material. Attempts to purify this material by volatilization of the iron as chloride have been uneconomic; good results were obtained by treatment with phosgene gas, but at uncommercial costs. Experiments now in progress in attempting to acid leach the residual impurities after a preliminary wash and screening seem to have considerable chance of ultimate success.

Since the imported material is brought in cheaply as ballast, treatment charges on local sands could not at present exceed 50 or 75 cents per ton.

Potash Research Program of Bureau of Mines

AN EXTENSIVE RESEARCH on the extraction of potash from several minerals has been organized during the past two years by the United States Bureau of Mines. Special attention has been given to Texas polyhalite, Wyoming leucite, and New Jersey greensands as raw sources of potash. This work, which is being conducted at the Bureau's Nonmetallic Minerals Experiment Station in co-operation with Rutgers University, New Brunswick, N. J., has indicated three economically feasible processes for the extraction of potash from polyhalite.

Details of the polyhalite work will be published in the near future. With regard to greensands and leucite, detailed economic surveys and analyses have been made of the various proposed processes, and a limited number of the latter have been selected as desirable subjects for laboratory investigations.

The potash research organization is essentially as follows: First—The mining section, which has done the core drilling in Texas and co-operated with the U. S. Geological Survey in estimating the character and extent of the potash deposits. Second—The economic and statistical section, which conducts economic analyses of proposed processes. Third—The chemical research division, which investigates the fundamentals of the chemistry involved in any process. Fourth—The chemical engineering laboratory, which tests the more favorable processes on a semi-commercial scale.

The progress on the extraction of potash from polyhalite has been very rapid, but so far as greensands and leucite are concerned, the development of economically feasible processes has necessarily been slow.

The results of these researches will be made public as they progress.

Senate Reverses Action and Puts Tariff on Cement

IN the second reversal on a major item in the tariff bill within three days, the Senate March 7 voted 45 to 37 to make cement dutiable at 6 cents per 100 lb. The House rate on this item, with which the Senate figure must be compromised in conference, is 8 cents.

When the tariff bill was in committee of the whole, the Senate on January 31 voted 40 to 35 in favor of keeping cement on the free list. A change of five votes repealed this former action.

Reconsideration in Senate

Motions for a third consideration of both the sugar and cement items were made in the Senate by Senator Nye (Rep.) of North Dakota. Mr. Nye voted for the sugar increase and just before the result on cement was announced changed his vote in favor of the 6-cent duty in order, he explained, that he might have the right to move for reconsideration. Under the rules of the Senate, a senator, to make a motion for reconsideration of a vote, must have voted with the majority.

Senator Nye explained that his purpose in filing the motions for reconsideration was to make his own record clear. Since the vote on sugar, he said, when he voted for the increase, "I have come more thoroughly to appreciate and more clearly to see the possibilities that lie in that sugar vote."

While a change in his vote perhaps would not alter the decision, stated the North Dakota senator, he "did not want to be charged with any part in a trade, however incorrectly."

Senators who voted January 31 to keep cement on the free list and on March 7 to make it dutiable at 6 cents per 100 lb. were: Couzens, Nye and Pine (Rep.), Tydings and Wagner (Dem.), Senator Pitman (Dem.) of Nevada, who was paired in favor of the 6-cent rate, was paired January 31 in favor of retaining cement on the free list.

Arguments Pro and Con

Senator Kean (Rep.) of New Jersey proposed a rate of 6 cents instead of 8. Questioned by Senators Norris (Rep.) of Nebraska; Borah (Rep.) of Idaho, and McMaster (Rep.) of South Dakota, Mr. Kean said that he still thought 8 cents was the needed protection but had reduced it to 6 cents because some senators had told him they would vote for it though they would not vote for 8 cents.

"Then the senator proposes 8 cents to accommodate those senators who want to change their votes?" asked Mr. Borah.

"Yes," replied Senator Kean.

Senator Vandenberg (Rep.) of Michigan contended that the situation had changed since the Senate last voted on cement, in the removal since from the bill of all countervailing duties. At the present time, he said, there is an 8 cents retaliatory tariff against Canadian cement.

Senator McMaster declared that the cement trust in the United States "dominates and dictates to the industry regardless of price." When the Finance Committee was considering the tariff bill, the cement trust, he stated, lowered the prices at will as an argument in behalf of protection.

The real object behind this demand for a tariff is so that the strong interests into whose hands the industry is gravitating can increase the price to the consumers of this country, Senator McMaster said.

Senator Barkley (Dem.) of Kentucky, in opposing a cement duty declared that senators who vote for higher duties on individual items need not try to "square" themselves with their constituents by voting against the bill as a whole.

Senator Copeland (Dem.) of New York stated that if the tariff is not provided a large number of laborers will be thrown out of work and that his state particularly would be affected. He urged the adoption of the proposed duty.

By a vote of 78 to 2 the Senate reduced the proposed duty from 8 to 6 cents per 100 lb.

The Senate then proceeded to adopt the rate of 6 cents on cement in preference to the free list by a vote of 45 to 37.

How Senators Voted

There were 37 senators who voted to put cement on the free list and against the Kean amendment.

Republicans (13): Allen, Blaine, Borah, Capper, Cutting, Frazier, Glenn, Howell, La Follette, McMaster, Norbeck, Norris, Schall.

Democrats (24): Barkley, Black, Blease, Bratton, Caraway, Connally, Fletcher, George, Glass, Harris, Harrison, Hawes, Hayden, Heflin, Sheppard, Smith, Steck, Stephens, Swanson, Thomas of Oklahoma, Trammell, Walsh of Massachusetts, Walsh of Montana and Wheeler.

There were 45 senators voting for the 6-cent duty proposed by Mr. Kean.

Republicans (36): Baird, Bingham, Couzens, Dale, Fess, Goff, Goldsborough, Gould, Greene, Grundy, Hale, Hastings, Hatfield, Hebert, Johnson, Jones, Kean, Keyes, McCulloch, McNary, Metcalf, Moses, Nye, Oddie, Patterson, Phipps, Pine, Robinson of Indiana, Robison, Shortridge, Smoot, Steiwer, Vandenberg, Walcott, Waterman and Watson.

Democrats (9): Ashurst, Brock, Broussard, Copeland, Dill, McKellar, Ransdell, Tydings, Wagner.

Paired—14

Paired for a duty: Townsend, Sullivan and Thomas of Idaho (Rep.), Pittman (Dem.).

Paired against the duty: Kendrick, King (Dem.); Brookhart (Rep.) and Shipstead (Farmer-Labor).

General pairs: Reed and Robinson; Deneen and Overman; Gillett and Simmons.

Senator Nye first voted against the duty and then changed his vote for the purpose of later moving a reconsideration of cement. Senator Overman announced that if permitted to vote he would have voted against the duty.

Other Rock Products Considered

Senator Allen (Rep.) of Kansas proposed re-establishing the House rate on unmanufactured pumice stone. The proposal was adopted. This makes the rate 1/10 cent per pound on such stone if valued at $15 or less a ton and ¼ cent per pound if valued at more than $15 a ton. The committee of the whole had accepted the finance committee amendment making the rates respectively 1/20 cent and ⅛ cent per pound.

Senator Pittman (Dem.) of Nevada introduced an amendment to place a tariff of $3.50 a ton on sand containing 95% or more of silica suitable for use in the manufacture of glass, and crude silica. This would leave silica for use as a pigment on the free list. The committee of the whole had placed all silica on the free list. The amendment was adopted.

Senator Watson (Rep.) of Indiana proposed an amendment rewriting the paragraph on mica. Senator La Follette (Rep.) of Wisconsin objected that the rewriting was technical in nature and could not be discussed fairly without first being printed. The Indiana Senator withdrew his request for immediate consideration.—*U. S. Daily.*

Imported Cement in South

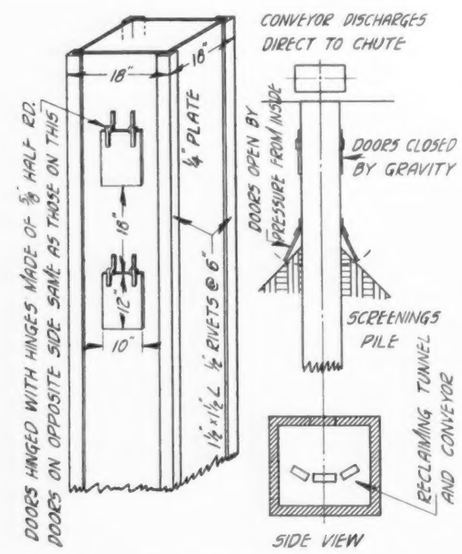
COMPETITION between American produced cement and the Belgian imported product has started something in the south, according to the *San Bernardino* (Calif.) *Sun.* This paper reports a "feud" between Norfolk, Va., and Richmond of the same state because that neighboring city bought Belgian cement when there was plenty of domestic cement at Norfolk. The state of North Carolina bought 185,000 bbl. of Belgian cement and then the row was on, for it was revealed that the Belgian cement was packed in jute sacks and the Norfolk cement manufacturers had been patronizing the cotton industry by packing in cotton sacks. Savannah, Ga., does not have a cement plant, but it sympathized with the southern cement industry by passing an ordinance prohibiting the use of foreign cement on public works.

Hints and Helps for Superintendents

Chute to Prevent Blowing of Screenings

By NELSON SEVERINGHAUS
Superintendent, Consolidated Quarries Corp., Lithonia, Ga.

BELOW is a sketch of a chute which we have found quite successful in the prevention of scattering with wind in stock-



Details of chute to prevent wind-scattering of screenings during stockpiling

piling screenings. As the cone builds up, doors on opposite sides of the chute near the top of the pile are opened by pressure of screenings from inside. Those above the pile are so hinged that they automatically close by gravity. Thus the screenings always roll out easily over the top of the cone and are not dropped through space where the wind can get at them to scatter.

The chute is fastened at the top to the framework of the conveyor which feeds it. It has no bottom support. It has withstood daily building up and drawing out without appreciable bending.

Crusher Repairs

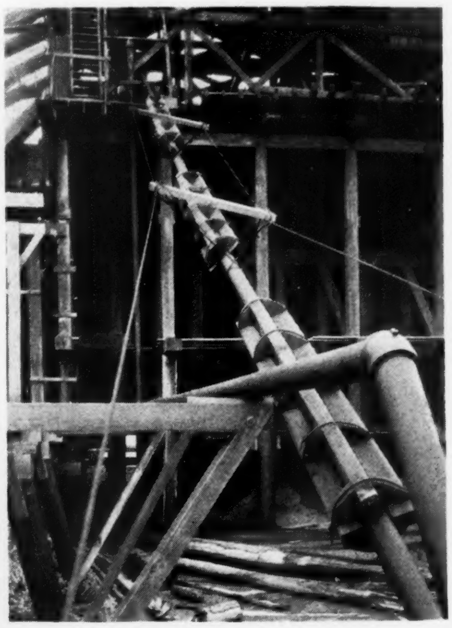
AT the plant of the Carolina Road Granite Co., Elm City, N. C., they have installed two convenient babbitt melting ladles of the type shown. Now there is nothing particularly unusual about these ladles except that one is located permanently near the primary jaw crusher and the second similar installation near the secondary crushers so that in the event of bearing replacements the work can be done quickly and make unnecessary the usual hunt for a suitable ladle, which is never in its proper place when wanted for an emergency.

The larger ladle swings from an overhead hanger and can be pulled back off from the fire if desired. The ladle itself is of cast iron, as wrought iron is readily attacked by hot babbitt. Firing is done by coal and air for combustion supplied from a compressor.

Babbitt melting equipment placed near the crushers facilitates repairs

Pipe Line Support

THE sand and gravel industry of the northwest can be said to center at Steilacoom, Wash., for at that place are located some of the largest deposits of gravel found anywhere in the United States. The deposits extend several hundred feet above the water level of Puget Sound and for an unknown depth below water level. There are three operators in the district and all employ the unusual practice of washing with salt water pumped direct from Puget Sound. This salt water is also used for sand classification. No ill effects have apparently resulted from this procedure, although it is known that plaster producers shipping into



A novel support for a pipeline

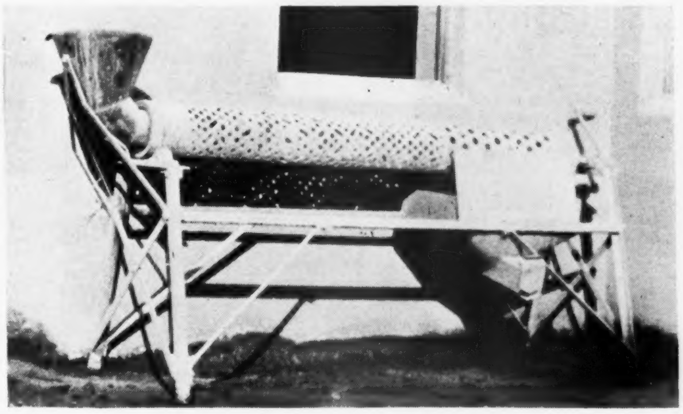
that territory have to add several pounds of retarder per ton to the plaster to offset the accelerating effect of the salty sands.

One of the newer operations in the district is that of the Glacial Gravel Co. at which plant the accompanying photo showing a novel method of reinforcing the salt water pipe from the pump so as to reach the plant without constructing a bridge to carry the pipe line, was taken. The pipe is surrounded at three points by four 4x4's and lashed to the pipe by wood yokes and 3/8-in. strap irons that can be taken up by threads and nuts. Two 5/8-in. cables also add to the stability of the pipe line.

Clinker Screening Device

SOME cement burners believe it to be of advantage to know the percentage of clinker of different sizes, especially of the sizes larger than 1-in. By such information better control of the kiln and its temperatures is effected, it is said.

The accompanying illustration of a home-made screening device, while not in use at the particular plant this picture was taken, does show a simple sample screening device that could be used in practically all of the rock products industries.



Device for screening clinker

Stripping a Limestone Quarry in New Zealand

A NOVEL adoption of a power drag scraper for stripping a New Zealand limestone quarry is reported in a recent issue of the *Sauerman News*. The overburden is a stiff yellow clay which is first removed by the scraper after which the crevasses are cleaned out hydraulically.

The quarry is operated by the Wilson (N. Z.) Portland Cement, Ltd., at Portland, Whangarei county; this company produces standard portland cement, Wilsonite, a high early strength cement, and hydraulic lime. The scraper outfit has been in use since 1927.

The limestone deposit is in hilly country and the disposal of the strippings is ordinarily well taken care of by dragging the clay to the foot of slope, where the stripping is being done. Such a pile of strippings at the foot of a hill is shown in one of the accompanying illustrations.

During the summer season the clay gets very hard and the work is quite difficult. The output, although cut down during the driest weather when the clay is unusually hard-packed, often runs about 60 cu. yd. per hour, which is considered satisfactory.

In many places the clay overburden lies only 2 to 3 ft. thick, and the operation of the scraper consequently involves fairly frequent shifting of the line of operation. The scraper outfit therefore includes, besides the standard rear bridle cable for shifting the tail anchorage, a Sauerman hand-winch shifting device. This consists of a "loading block" (also called a flying block) that rides one of the scraper's operating cables. This loading block is attached to a shifting cable passing over a guide block at one edge of the property and thence to the hand winch, so that to change the scraper's line of operation it is necessary simply to take up on the winch and shifting cable.

The power unit of the 1½ cu. yd. scraper outfit is a Sauerman electric scraper hoist with a digging speed of 200 f.p.m.

The Wilson company intends to make further use of it on plant grounds for storing and reclaiming reserve supplies of coal and crushed limestone.

Device Gives Warning When Barge Lists

CAPTAIN John Jacobson of Barge 25, Warner Co., is the inventor of a unique safety device for barges, according to the *Warner-American News*. Through its use notice of a dangerous list on the barge is given with ample time to remedy this condition or, if this is impossible, it gives a chance for the crew to escape before the boat turns turtle. These lists are not an unusual occurrence in barges, shifting cargo or leaks in the hulls being mainly responsible. The device is quite simple—a plumb bob in the center of a fixed box swinging like a pendulum and making electrical contact with nail terminals at either side of its point as the barge lists over. The contacts cause an alarm to ring. However, in the later development of the device the pendulum has been discarded in favor of mercury flowing in glass tubes because of the surer contact.

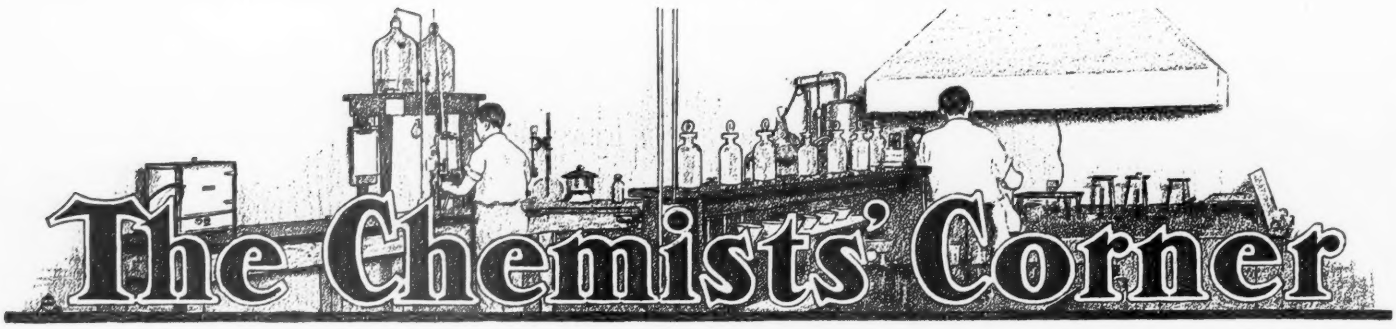
Counterweight Guards

THE cut illustrates another use for discarded rotary screen sections. In this case it prevents walking under the reinforced concrete counterweights that are a part of the crusher operation. Incidentally, we might suggest that concrete makes an admirable and sightly counterweight for any purpose.

A guard against possible "headaches"

Power drag scraper stripping heavy clay overburden at a New Zealand limestone quarry

Following removal of topsoil, the crevasses were cleaned hydraulically



Especially For the Cement Plant Chemist

A New Department of Rock Products—And the Announcement of a Prize Contest

LATE in 1929 the editor of ROCK PRODUCTS conducted an interesting and instructive correspondence with a man who has done and is doing much valuable research work for one of the portland cement companies. We presume there are many like him because nearly all of the cement companies have been active in such research work during the last two or three years.

He wrote: "There are data of general interest accumulated during our work which we could publish at rather frequent intervals as journal articles. You understand, however, that a manufacturer is not inclined to release data that might give him a material advantage over competitors. We are finding that data, which are of such a nature as to be of value to other cement men and yet do not disclose our hand too much, are frequently not of sufficient extent to justify a long article.

"This has suggested to us the probability that there are many other chemists and chemical engineers in the cement industry who are in the same position. At one time or another they make short investigations, discover interesting facts, develop analytical short-cuts, etc., which they do not feel are extensive enough to publish as journal articles but which they would be glad to release in exchange for similar contributions from others through the medium of a department in one of our trade journals.

"We do not know of any department of this kind in a cement journal, but we believe that, if one were initiated, contributions would be forthcoming from many quarters and considerable interest would be aroused among cement chemists. Even if, at first, the items were not frequent enough to justify listing the department every month we believe that it would be read with interest when it did appear, and the knowledge that it existed should inspire contributions which would not otherwise be sent in.

"We believe that with your journal you are rendering the industry an important service and one which might well be extended to include such a department. We hope that you will not think us impertinent in offering this suggestion. We realize that you cannot act in accordance with all suggestions sent you and further that we may have overlooked factors which make this one impractical from your standpoint. We have felt free in making it, however, because we believe that you are interested in obtaining information on the varied interests of your subscribers and, further, because of your published statements inviting chemists to contribute to your journal."

To which the editor promptly replied: "I shall certainly act with alacrity on your suggestion and will send out a letter to all the cement plant chemists soliciting them to contribute, and we hope to have the department going in full blast by our first January issue."

Unfortunately we could not act with the alacrity we hoped and expected because of the pressure of other things during the first two months of the year. But here it is: "The Chemists' Corner" launched in the hope that we shall never want for a contribution for each and every issue from now on.

To make the launching a little more interesting we announce that every contribution published in this department, in addition to being paid for at a liberal rate on publication will be entered in a prize contest. The author or authors of the best contribution published in 1930 will receive a cash prize of $100 in time for Christmas; the next best $50 and the third $25—all in real money in time to spend for Christmas.

To judge these contributions the following gentlemen, all well known experts in cement chemistry, have consented to serve: **P. H. Bates,** United States Bureau of Standards, Washington, D. C.; **Richard K. Meade,** consulting chemist, Baltimore, Md., and **H. E. Brookby,** consulting chemist, Chicago, Ill.

There is no formality about entering this competition. Being a contributor to this department makes you eligible for a prize—in addition, of course, as already stated, to the regular payment for the contribution.

There is no specified length for the proposed articles; nor does the editor attempt to circumscribe the subjects to be covered. All that is required is that they be in keeping with the object of this new department, which is so admirably described by our correspondent responsible for its existence. The editor welcomes discussions of articles printed here. It is conceivable that such a discussion may be quite as valuable and as good an entry for the prizes as the original article. It is also suggested that questions and queries and suggestions be offered. A special column could well be devoted to them. On the opposite page is the first article in this new department.

Prizes of $175

ALL CONTRIBUTORS to this new department of ROCK PRODUCTS are automatically entered for a chance to win $100 for the best contribution; $50 for the next best, and $25 for the third best. The prizes are to be awarded by Christmas, 1930. In addition, all contributors will receive regular compensation at liberal rates for their contributions as published. Be sure to read the details. —Editor.

Calculation of Raw Mix for Experimental Production of Clinker

By Harold H. Steinour and Hubert Woods
Riverside Cement Co., Crestmore, Calif.

IN A STUDY of the effect of systematic variations in the chemical composition of cement raw mix the desired compositions may, of course, be obtained in a number of different ways. If the chemically pure oxides are used their proper proportioning is a relatively simple matter. If, however, a large number of compositions are to be experimented with, in quantities sufficient to make a number of strength tests, the use of c.p. chemicals is rather costly. Chemicals of technical purity may be obtained in sufficient quantity at reasonable cost. The impurities in such chemicals are quite appreciable but, fortunately for the experimenter who desires to use them for the production of cement, practically all of these impurities are simply other oxides normally present in cement mix. Their presence, however, lengthens the calculations necessary to determine the proper proportions.

The compounding of cement raw mix either from the c.p. or a technical grade of chemicals entirely, with the object of determining the effect which variations in chemical composition would have upon the production and properties of cement from any particular commercial mill, has one obvious disadvantage. This is the difference that necessarily exists between the laboratory and plant mixes with respect to the chemical combination of the initial materials and associated with that, their physical properties. It is conceivable that this difference may have a pronounced influence especially upon the burning conditions.

The "Plant Mix" Basis

The difficulty may be greatly diminished if plant kiln feed is used as the basis for the new compositions, the desired changes in analysis being obtained by the addition of the amounts of oxides necessary, using lime and magnesia in the form of the carbonates and silica in a finely divided state. Then the bulk of the mix will ordinarily consist of the plant mix, and the added oxides will be relatively small in amount. If it is necessary to add a large amount of any oxide, it is very probable that in order to produce such a composition in the plant a similar addition would also have to be made there, so the experimental conditions would still approximate what they would be in practice. The adoption of this plan also further reduces the cost of the materials.

For any given mix there will be one of the technical oxides which it will be unnecessary to add, if the maximum proportion of plant kiln feed is used, for the latter contains some of each oxide. Since a maximum proportion of the kiln feed is desirable for the reasons just stated, the calculation of the mix should be designed to that end and this condition of zero amount of one technical oxide may be made the basis for determining the proportions which will give that maximum.

Thus, an equation can be set up for each of the five major oxides, CaO, MgO, SiO_2, Al_2O_3, Fe_2O_3, in which the percentage of that oxide in the clinker is given in terms of the percentage contributed by each raw material: The five technical oxides and the plant kiln feed. These equations can then be solved simultaneously for the proportions of technical oxides required, the results being obtained in terms of the proportion of kiln feed. The maximum proportion of the latter can then be found by setting equal to zero that oxide which is not needed, which may be seen by inspection.

Calculating the Mix

The time required for this procedure would be almost prohibitive if it were necessary to repeat it in its entirety for each composition. However, by first obtaining a general solution, which may be adapted to any clinker composition by substitution of the desired percentages, a mix can thereafter be calculated and checked in a very short time. Moreover, if it becomes necessary to use a new lot of kiln feed due to the depletion of the old lot, the equations may be adapted to the new composition with only a small amount of recalculation.

During the course of the writers' work a large number of compositions were prepared using plant raw mix (kiln feed) as the basis of the compositions, variations being obtained by the use of technical grades of calcium carbonate, magnesium carbonate, silica, alumina and ferric oxide. Data from this work will serve to illustrate the process of obtaining a general solution.

General Equations

The analyses of the raw materials are given in Table I, the percentages being expressed in terms of the weight of the ignited sample. The final column gives the percentage of the original material which was lost in ignition. It will be seen from the table that the amount of CaO in clinker prepared from these six raw materials is given by the following equation:

$$\mathrm{CaO}=0.969\mathrm{C}+0.036\mathrm{M}+0.018\mathrm{S}+0.0\mathrm{A}+0.0\mathrm{F}+0.650\mathrm{R}$$

For the general solution, the CaO and the R must be treated as constants of unassigned values. By transposing the R term to the other side of the equation the single constant Co may be substituted for CaO—0.650R. Similar equations may be set up for each of the remaining four oxides, in which Mo, So, Ao, Fo may be used similarly to Co, for the expressions involving MgO, SiO_2, Al_2O_3, Fe_2O_3. The five equations will then read:

$$0.969\mathrm{C}+0.036\mathrm{M}+0.018\mathrm{S}+0.0\mathrm{A}+0.0\mathrm{F}=\mathrm{Co}$$
$$0.010\mathrm{C}+0.951\mathrm{M}+0.009\mathrm{S}+0.0\mathrm{A}+0.0\mathrm{F}=\mathrm{Mo}$$
$$0.007\mathrm{C}+0.008\mathrm{M}+0.957\mathrm{S}+0.0\mathrm{A}+0.097\mathrm{F}=\mathrm{So}$$
$$0.0\mathrm{C}+0.0\mathrm{M}+0.006\mathrm{S}+1.0\mathrm{A}+0.093\mathrm{F}=\mathrm{Ao}$$
$$0.0\mathrm{C}+0.0\mathrm{M}+0.007\mathrm{S}+0.0\mathrm{A}+0.799\mathrm{F}=\mathrm{Fo}$$

The next step is to solve these simultaneous equations for C, M, etc. This may be done by successive elimination of unknowns or by the use of determinants. Although very simple in principle, this part of the development is rather tedious. It should be performed with care to prevent errors which will be difficult to locate afterwards. The work is much shortened by setting insignificant amounts of impurities equal to zero and by using only as many decimal places as are justified by the accuracy of the data. The solutions which we obtained were:

$$\mathrm{C}=1.032\mathrm{Co}-0.039\mathrm{Mo}-0.019\mathrm{So}+0.002\mathrm{Fo}$$
$$\mathrm{M}=-0.010\mathrm{Co}+1.051\mathrm{Mo}-0.010\mathrm{So}+0.001\mathrm{Fo}$$
$$\mathrm{S}=-0.008\mathrm{Co}-0.008\mathrm{Mo}+1.045\mathrm{So}-0.126\mathrm{Fo}$$
$$\mathrm{A}=-0.006\mathrm{So}+\mathrm{Ao}-0.115\mathrm{Fo}$$
$$\mathrm{F}=-0.009\mathrm{So}+1.252\mathrm{Fo}$$

So far the composition of R has not been introduced into the calculations and hence these equations hold good whatever is the analysis of R. Consequently, as stated above,

TABLE I—COMPOSTION OF RAW MATERIALS USED IN CEMENT MIX

No.	Material	Symbol for ignited material	Percentage compositions on basis of ignited materials: CaO	MgO	SiO_2	Al_2O_3	Fe_2O_3	Loss on ignition percent.
682	Plant raw mix (kiln feed)	R	65.04	4.88	21.68	6.04	2.38	32.72
687	Calcium carbonate	C	96.93	0.98	0.74	0.53		42.98
686	Magnesium carbonate	M	3.59	95.1	0.78	0.55		56.24
688	Silica (Filter-cel)	S	1.76	0.90	95.75	0.63	0.72	10.52
684	Alumina	A	0.0	0.0	0.36	99.25	0.39	0.46
685	Ferric oxide	F	0.18	Trace	9.68	9.27	79.92	3.24

if it is desired to change to the use of a new lot of kiln feed the preceding calculations do not need to be repeated. Substitution of the expressions denoted by the symbols Co, Mo, etc., brings the equations into their final form:

$$C = 1.032 \times CaO - 0.039 \times MgO - 0.019 \times SiO_2 + 0.002 \times Fe_2O_3 - 0.665R$$
$$M = -0.010 \times CaO + 1.051 \times MgO - 0.010 \times SiO_2 + 0.001 \times Fe_2O_3 - 0.042R$$
$$S = -0.008 \times CaO - 0.008 \times MgO + 1.045 \times SiO_2 - 0.126 \times Fe_2O_3 - 0.219R$$
$$A = -0.006 \times SiO_2 + Al_2O_3 - 0.115 \times Fe_2O_3 - 0.056R$$
$$F = -0.009 \times SiO_2 + 1.252 \times Fe_2O_3 - 0.028R$$

Producing Clinker of Desired Analysis

Suppose it is desired to produce a clinker of the following analysis:

$$CaO = 64.5\% \quad SiO_2 = 20.5\% \quad MgO = 5.0\%$$
$$Al_2O_3 = 7.0\% \quad Fe_2O_3 = 3.0\%$$

Substitution of these values in the above equations gives results as follows:

$$C = 66.0 - 0.665R$$
$$M = 4.4 - 0.042R$$
$$S = 20.5 - 0.219R$$
$$A = 6.5 - 0.056R$$
$$F = 3.6 - 0.028R$$

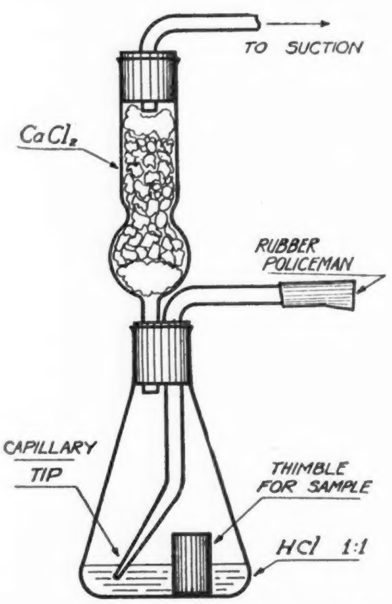
It remains to determine the maximum value of R, which it will be remembered is that value which will cause one of the raw materials, C, M, S, A or F, to be equal to zero. The highest possible value of R under any circumstances is 100, for the sum of the oxides is equal to 100%. Mental substitution of 100 for R gives C and S negative values. This means that a gradual reduction in the value assigned to R would bring each of them to zero and then to positive values. The last to be brought to zero would be the determining oxide since all final values must be positive. This oxide will be the one whose equation exhibits the greatest proportionate difference between the first term and 100 times the factor of R. For C this is 0.5 in 66.0, and for S, 1.4 in 20.5. Hence it is greatest for S, and making S equal to zero gives the maximum value of R. The amounts of C, M, etc., obtained using this value of R may then be converted to the corresponding amounts of the non-ignited raw materials by dividing by (1—ignition loss). Multiplication by a common factor gives any desired total amount of mix. The values of C, M, etc., may be checked by substitution in the equations as they were first drawn up.

It is advisable to clinker some of the plant kiln feed under the same conditions which it is desired to maintain in the experimental burns and to use the analysis of this clinker in the equations rather than to calculate it from the analysis of the raw material. We have found that under our conditions of burning the two do not check closely.

All of the clinkers which we prepared were analyzed and it was found that the results could normally be counted upon to check the calculated ones within 0.5%, the great majority of them checking much closer than that.

Determination of Carbon Dioxide in Carbonates

A SIMPLE and routine process with ease of manipulation and fair degree of accuracy is described in a recent issue of the *Analytical Edition, Industrial and Engineering Chemistry*. The method given follows (with reference to the sketch): Fit a 50 cc. Erlenmeyer flask with a 2-hole rubber stopper bearing a short calcium chloride tube filled with granular calcium chloride of about 16 mesh. This calcium chloride tube is best prepared by cutting down the regulation tube so that its length is not over 7.5 cm. Fit the upper end of the tube with a 1-hole rubber stopper bearing a short glass tube just coming through the stopper and bent at right angles above so as to make a convenient attachment for the suction pump. This stopper and tube may be left off during the weighing. If desired, the tube may be closed by means of a rubber policeman. Fit the other hole of the stopper with a glass tube drawn out to a capillary at the lower end and reaching nearly to the bottom of the flask. Bend it at right angles above the stopper to make a convenient attachment for the purifying train, and, unless otherwise specified, close it with a rubber policeman during the determination.



Apparatus for routine determination of carbon dioxide in carbonates

The purification train consists of two fairly large U-tubes, the one next to the apparatus filled with calcium chloride and the other filled with soda lime. The air as it enters the apparatus is drawn through this purification train and is thus rendered free from carbon dioxide and dried.

Determination—When the apparatus has been assembled as described, place about 15 cc. of dilute hydrochloric acid (1:1) in the flask. Introduce the carefully weighed sample (about 0.50 gram) in a glass thimble so that the thimble stands upright in the acid. This thimble is best prepared by cutting off the lower inch of a regulation 2-dram homeopathic vial and firedressing the edges. If desired, the apparatus may be weighed before the introduction of the thimble and sample and the two weights added to give the total weight of the apparatus.

After the apparatus has been carefully weighed, overturn the thimble by tipping the flask. The inlet tube must be closed and the outlet tube must be open during the reaction. When the reaction has subsided attach the apparatus to the purifying train and pump and apply suction, so that the bubbles pass through the apparatus at the rate of about two per second. Continue this aspiration for 15 minutes at this rate. Then detach the apparatus, replace the rubber policeman, and weigh the entire apparatus. The loss in weight is calculated as carbon dioxide.

The time required for making the determination is about 20 minutes. The average sample will be about 0.5000 gram, but when the carbon dioxide content is high 0.3000-gram samples should be used.

Joseph Lang

JOSEPH Lang, long known to quarry operators throughout the United States, died on March 7 in a hospital at Englewood, N. J., where he had been a patient since December 9, when he underwent an operation from which he was well on the way to recovery when pneumonia developed and resulted in his death.

"Uncle Joe," as he was familiarly known, was the dean of the New York sales organization of the explosives department of E. I. du Pont de Nemours and Co., and would have rounded out his 47th consecutive year with the company on March 17. He observed his 75th birthday on February 8. He was born in Devonshire, England, but came to America when but 10 years of age. Until two years ago, Mr. Lang continued to handle the entire work of his territory and was still active in the selling of explosives until shortly before he entered the hospital early in December.

Compressive Strength of Clay Brick Walls

RECENT research carried out at the National Bureau of Standards, dealing with the compressive strength of clay brick walls, has been incorporated into Research Paper No. 108. The investigation showed the solid walls to be stronger than the hollow types. With brick of rectangular cross section the hollow wall strengths varied about as the net areas in compression. When the bricks were not truly rectangular in section, the strength of the hollow walls was found to be less than that expected from the net area. Construction data are given which show the relative saving in materials and time for the hollow types.

Editorial Comment

Wanted—A Tariff Based on Economics

The action of the United States Senate in reversing its previous action on the portland cement schedule of the pending tariff bill is an interesting example of the reason why industry needs a tariff commission with sufficient power to carry out its findings and recommendations. By a pure case of political trading (log rolling) the portland cement industry has succeeded in getting the Senate to vote a 6c per 100 lb. tariff, while the tariff commission, the House of Representatives and the Finance Committee of the Senate, each and all, after mature consideration of all the facts and the merits of the case, recommended or adopted an 8c per 100 lb. tariff. Certain senators desiring an increased tariff on sugar, to protect a very localized and doubtfully sound home industry, apparently specifically voted originally against a cement tariff in order later to trade their votes for votes for the sugar tariff. Thus are American protective tariffs—designed for economic aids to industry—actually made. To the everlasting credit of the cement industry let it be said that it tried every other recourse first; and that its tariff plea is sound and irrefutable regardless of how it was established.

Fine Aggregate

In his report to the National Sand and Gravel Association, Stanton Walker, director of the Association's research, made the statement that: "So far as concrete is concerned, it is the firm belief of the writer that the fine aggregate plays a more important role, on the whole, than the coarse aggregate." There is something of a challenge in this statement to the conclusions drawn from the well-known tests of coarse aggregate that were made in 1928 and 1929, in which the effect of the fine aggregate used was ignored. But, while the statement in the review is unsupported by evidence, such evidence as can be gathered from the reports of other investigators tends to show that the importance of fine aggregate has not been sufficiently considered until in the last year or two and is not fully appreciated by the concrete industry even now.

H. F. Gonnerman's paper on fine aggregates read at the 1929 meeting of the American Society of Testing Materials certainly supports Walker's view. And in this paper he quotes from the German investigators, Graf and Merkle, who decidedly uphold it. Graf in fact, says that the strength of concrete is determined by the gradation of the mortar materials (cement plus sand) and increases and decreases as the curve approaches and recedes from his ideal curve. H. F. Kriege reported in Rock Products, December 24, 1928, that it was possible to vary the strength of concrete at will by varying the amount of fines in the fine aggregate while keeping within the specification limits.

Fortunately, fine aggregate is made from materials amenable to manufacturing processes that can change their mortar-making characteristics. This is shown by the fact that, almost, if not quite, every sand plant in the United States that has been in operation more than ten years has made changes in its washing and screening equipment and brought its product up to meet the demands of more rigid specifications. In fact most sand producers have gone farther than the specifications required them to do. A more striking example may be found in the experience of certain crushed stone producers who wanted to find a market for screenings. The Marble Cliff Quarries Co.'s high grade manufactured product, competing freely with the excellent natural sand of the same locality, is perhaps the best known example, but the France Stone Co. obtained equally good results by washing and grading screenings that were admittedly unsatisfactory in the raw state. Even finely crushed slag, which from the nature of the material, tends to make harsh and unworkable mortars, has proven itself amenable to manufacturing process and is satisfactorily used in some localities.

The unfortunate side of this development of fine aggregate is that much of the work has been done individually and is the result of cut and try methods. The experience of one producer is not available to all producers, and if it were it is not arranged so as to be susceptible to analysis and discussion of a nature that would bring out the fundamental principles involved. It is for this reason that the effect of fine aggregate on the strength and workability of concrete is a subject not only for general research but research that is particularly needed by the concrete industry as a whole. Kriege, for example, states that his experiments tend to show that different gradations of sand for use with gravel and crushed stone may be desirable. At a time when every effort is being made to get the greatest possible flexural strength in concrete highway pavements it might be worth going to the trouble of securing the gradation best adapted to the coarse aggregate.

The producer who makes a special fine aggregate will have to be paid for it, of course, but this is what has been the history of the aggregate industry. It has been built up to its present high status by making better products and getting more money for them. And the spirit of the whole industry ought to be that of one of the largest producers of fine aggregate who answered a request for a sample of sand by saying: "This sample is our standard grading for the purpose, but if your experience shows that another gradation would be more satisfactory we are able to supply it."

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. 1st 6's[29]	2-24-30	80	82	
Alpha P. C. new com.	3- 8-30	30½	31	75c qu. Jan. 15
Alpha P. C. pfd.	3- 8-30	110	....	1.75 qu. Mar. 15
American Aggregates com.[29]	3-12-30	19	25	75c qu. Mar. 1
Amer. Aggregate 6's, bonds[29]	3-12-30	....	90	
American Brick Co., sand-lime brick	3-10-30	....	5	25c qu. Feb. 1
American Brick Co. pfd., sand-lime brick	12-13-29	....	80	50c qu. Feb. 1
Am. L. & S. 1st 7's[29]†	2-24-30	95	97	
American Silica Corp. 6½'s[49]	3-12-30	No market		
Arundel Corp. new com.	3-10-30	45¾	46	75c qu. Jan. 1
Atlantic Gyp. Prod. (1st 6's & 10 sh. com.)[10]	3-11-30	No market		
Beaver P. C. 1st 7's[20]	1-10-30	....	100	
Bessemer L. & C. Class A[4]	3- 7-30	31½	32½	75c qu. Feb. 1
Bessemer L. & C. 1st 6½'s[4]	3- 7-30	90	92	
Bloomington Limestone 6's[29]	3-12-30	82	86	
Boston S. & G. new com.[47]	3- 8-30	16	20	40c qu. Jan. 1
Boston S. G. new 7% pfd.[47]	3- 8-30	46	50	87½c qu. Jan. 1
Calaveras Cement 7% pfd.	3- 7-30	85	90	1.75 qu. Jan. 15
Calaveras Cement com.	3- 7-30	10	14	
Canada Cem. com.	3-10-30	17¼	18	
Canada Cement pfd.	3-10-30	93	95	1.62½ qu. Mar. 31
Canada Cem. 5½'s[43]	3- 7-30	98½	99	
Canada Cr. St. Corp. 1st 6½'s[43]	3- 7-30	68	....	
Can. Gyp. & Alabastine (new)	3-10-30	24¼	24⅜	37½c qu. Jan. 2
Certainteed Prod. com.	3-10-30	12½	12⅞	
Certainteed Prod. pfd.	3-10-30	35	50	1.75 qu. Jan. 1
Cleveland Quarries	3-10-30	67	70	75c qu. 25c ex Mar. 1
Columbia S. & G. pfd.	2-24-30	85	90	
Consol. Cement 1st 6½'s, A	3-11-30	85	90	
Consol. Cement 6½% notes[24]	3-11-30	80	85	
Consol. Cement. pfd.[29]	3-12-30	50	60	
Consol. Oka S. & G. 6½'s[12] (Canada)	3-10-30	100	101	
Consol. Rock Prod. com.[5]	3- 6-30	2½	5	
Consol. Rock Prod. pfd.[5]	3- 6-30	22½	25	
Consol. S. & G. com. (Can.)[38]	2- 8-30	No market		
Consol. S. & G. pfd. (Can.)	3-10-30	85½	86	1.75 qu. Feb. 15
Construction Mat. com.	3-10-30	20	21	
Construction Mat. pfd.	3-10-30	38	39	87½c qu. Feb. 1
Consumers Rock & Gravel, 1st Mtg. 6's, 1948[18]	3- 8-30	92	96	
Coosa P. C. 1st 6's[29]	3-12-30	50	60	
Coplay Cem. Mfg. 1st 6's[40]	3- 8-30	90	....	
Coplay Cem. Mfg. com.[40]	3- 8-30	10	....	
Coplay Cem. Mfg. pfd.[40]	3- 8-30	70	....	
Dewey P. C. 6's (1942)	3-11-30	96	....	
Dewey P. C. 6's (1930)	3-11-30	96	....	
Dewey P. C. 6's (1931-41)	3-11-30	96	....	
Dolese & Shepard	3-10-30	82	86	$2 qu. & $1 ex. Jan. 2
Edison P. C. com.[30]	3- 8-30	10c	....	
Edison P. C. pfd.[30]	3- 8-30	25c	....	
Giant P. C. com.[2]	3- 8-30	20	30	
Giant P. C. pfd.[2]	3- 8-30	8	15	
Hermitage Cement com.[11]	3- 8-30	20	30	
Hermitage Cement pfd.[11]	3- 8-30	80	85	
Hermitage Cement 6's[11]	3- 8-30	101	104	
Ideal Cement, new com.[33]	3-10-30	55	58	50c spec., 50c ex. Dec. 21 & 75c qu. Jan. 1
Ideal Cement 5's, 1943[33]	3-10-30	96	99	
Indiana Limestone com.[29]	2-24-30	No market		
Indiana Limestone pfd.[29]	2-24-30	No market		1¾% qu. Mar. 1
Indiana Limestone 6's	3- 8-30	69	....	
International Cem. com.	3-10-30	63¾	64¾	$1 qu. Mar. 28
International Cem. bonds 5's	3-10-30	96½	97	Semi-ann. int.
Iron City S. & G. bonds 6's[46]	1-24-30	80	....	
Kelley Is. L. & T. new st'k	3-10-30	44	44½	62½c qu., 50c ex. Jan. 1
Ky. Cons. St. com. V. T. C.[48]	3- 6-30	11	13	
Ky. Cons. Stone 6½'s[48]	3- 6-30	94	98	
Ky. Cons. Stone pfd.[48]	3- 6-30	89	91	
Ky. Cons. Stone com.[48]	3- 6-30	11	13	
Ky. Rock Asphalt com.[11]	3- 8-30	15	18	
Ky. Rock Asphalt pfd.[11]	3- 8-30	89	91	1.75 qu. Mar. 1
Ky. Rock Asphalt 6½'s[11]	3- 8-30	99	103	
Lawrence P. C.	3- 8-30	50	60	
Lawrence P. C. 5½'s, 1942	2- 5-30	84	90	

Stock	Date	Bid	Asked	Dividend
Lehigh P. C.	3-10-30	39¼	40½	62½c qu. Feb. 1
Lehigh P. C. pfd.	3-10-30	106¾	108	1¾% qu. Apr. 1
Louisville Cement[7]	3- 7-30	230	....	
Lyman-Richey 1st 6's, 1932[13]	3- 7-30	95	....	
Lyman-Richey 1st 6's, 1935[13]	3- 7-30	94	....	
Marblehead Lime 6's[14]	3-10-30	94	98	
Marbelite Corp. com.	3- 7-30	310	....	
Marbelite Corp. pfd.	3- 7-30	12½	....	
Material Service Corp.[29]	3-12-30	22	....	50c qu. Mar. 1
Medusa Portland Cem.[29]	3-12-30	105	110	1.50 Jan. 1
Mich. L. & C. com.[6]	3- 8-30	35	....	
Missouri P. C.	3-10-30	35	35½	50c qu. Feb. 1
Monolith Portland Midwest[9]	3- 6-30	4½	5	
Monolith bonds, 6's[9]	1- 9-30	97½	100	
Monolith P. C. com.[9]	3- 6-30	9	10	40c s.-a. Jan. 1
Monolith P. C. pfd.[9]	3- 6-30	7½	8	40c s.-a. Jan. 1
Monolith P. C. units[9]	3- 6-30	25	28	
National Cem. (Can.) 1st 7's[43]	3- 7-30	99½	....	
National Gypsum A com.	3-10-30	7½	8½	
National Gypsum pfd.	3-10-30	30	35	
Nazareth Cem. com.[26]	3- 7-30	20	23	
Nazareth Cem. pfd.[26]	3- 7-30	100	103	
Newaygo P. C. 1st 6½'s[29]	3-12-30	101½	....	
New Eng. Lime 1st 6's[14]	3-10-30	90	95	
N. Y. Trap Rock 1st 6's	3-10-30	95⅛	95⅜	
N. Y. Trap Rock 7% pfd.[36]	3-10-30	95	....	
North Amer. Cem. 1st 6½'s	3-10-30	68	....	
North Amer. Cem. com.[29]	2-24-30	3	4	
North Amer. Cem. 7% pfd.[29]	2-24-30	21	26	
North Amer. Cem. units[29]	2-24-30	24	29	
North Shore Mat. 1st 5's[15]	3-11-30	95	....	
Northwestern States P. C.[37]	3- 8-30	130	....	$2 Jan. 1
Ohio River Sand com.	3-11-30	19	20	
Ohio River Sand 7% pfd.	3-11-30	98½	102	
Ohio River S. & G. 6's[16]	3- 8-30	85	95	
Pacific Coast Cem. 6's[5]	3- 6-30	80	85	
Pacific P. C. com.	3- 7-30	28	30	
Pacific P.C., new pfd.	3- 7-30	80	88	1.62½ qu. Jan. 5
Pacific P. C. 6's[5]	3- 6-30	99¼	....	
Peerless Cem. com.[21]	3- 8-30	8	10	
Peerless Cem. pfd.[21]	3- 8-30	82	85	1.75 Dec. 31
Penn-Dixie Cem. pfd.	3-10-30	54½	55	
Penn-Dixie Cem.com.	3-10-30	9½	9¾	
Penn-Dixie Cem. 6's	3-10-30	82	....	
Penn. Glass Sand Corp. 6's	3- 5-30	99	100	
Penn. Glass Sand pfd.	3- 5-30	100	....	1.75 qu. Jan. 1
Petoskey P. C.	3-10-30	8	8¾	15c qu. Dec. 31
Port Stockton Cem., units[9]	2-17-30	....	30	
Port Stockton Cem. com.[9]	3- 6-30	....	1	
Riverside Cement com.	3- 7-30	19	....	
Riverside Cement pfd.[9]	3- 6-30	75	82	
Riverside Cement, A[9]	3- 6-30	....	16	31¾c Feb. 1
Riverside Cement, B[9]	3- 6-30	4	....	
Roquemore Gravel 6½'s[17]	3- 8-30	99	100	
Santa Cruz P.C. 1st 6's, 1945	2-21-30	105¾	....	6% annually
Santa Cruz P. C. com.	3- 7-30	92	....	$1 Jan. 1 & $2 ex.
Schumacher Wallboard com.	3- 7-30	13	14	
Schumacher Wallboard pfd.	3- 7-30	23	24½	50c qu. Feb. 15
Southwestern P. C. units[44]	3-10-30	240	....	
Standard Paving & Mat. (Can.) com.	3-10-30	24½	25	50c qu. Feb. 15
Standard Pav. & Mat. pfd.	3-10-30	89½	90	1.75 qu. Feb. 15
Superior P. C., A	3- 7-30	38	40	27½c mo. Mar. 1
Superior P. C., B	3- 7-30	12	16	
Trinity P. C. units[37]	3- 8-30	135	145	
Trinity P. C. com.[37]	3- 8-30	50	....	
Trinity P. C. pfd.[29]	3-12-30	100	110	
U. S. Gypsum com.	3-10-30	48	48½	40c qu. Mar. 31
U. S. Gypsum pfd.[20]	3-12-30	113	117	1.75 qu. Mar. 31
Universal G. & L. com.[3]	3-11-30	75c	....	
Universal G. & L. pfd.[3]	3-11-30	8	10	
Universal G. & L., V.T.C.[3]	3-11-30	No market		
Universal G. &L. 1st 6's[3]	3-11-30	No market		
Warner Co. com.[16]	3- 8-30	49	49½	50c qu., 50c ex. Jan. 15
Warner Co. 1st 7% pfd.[16]	3- 8-30	105	108	1¾% qu. Jan. 2
Warner Co. 1st 6's[8]‡	3-11-30	97½	99½	
Whitehall Cem. Mfg. com.[36]	3-10-30	40	....	
Whitehall Cem. Mfg. pfd.[36]	3-10-30	48	....	
Wisconsin L. & C. 1st 6's[15]	3-11-30	95	....	
Wolverine P. C. com.	3-10-30	5	5¼	15c qu. Feb. 15
Yosemite P. C., A com.[9]	3- 6-30	2¾	3¼	

†$40,189 called for redemption at 106, Feb. 26, 1930. ‡$105,000 called for redemption at 105, Feb. 25, 1930.

Quotations by: [1]Watling Lerchen & Hayes Co., Detroit, Mich. [2]Bristol & Willett, New York. [3]Rogers, Tracy Co., Chicago. [4]Butler Beadling & Co., Youngstown, Ohio. [5]Freeman, Smith & Camp Co., San Francisco, Calif. [6]Frederic H. Hatch & Co., New York. [7]J. J. B. Hilliard & Son, Louisville, Ky. [8]Dillon, Read & Co., Chicago, Ill. [9]A. E. White Co., San Francisco, Calif. [10]Lee Higginson & Co., Boston and Chicago. [11]J. W. Jakes & Co., Nashville, Tenn. [12]James Richardson & Sons, Ltd., Winnipeg, Man. [13]Stern Bros. & Co., Kansas City, Mo. [14]First Wisconsin Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Citizens Southern Co., Savannah, Ga. [18]Dean, Witter & Co., Los Angeles, Calif. [20]Tucker, Hunter, Dulin & Co., San Francisco, Calif. [21]Baker, Simons & Co., Inc., Detroit, Mich. [22]Hemphill, Noyes & Co., New York, N. Y. [24]A. B. Leach & Co., Inc., Chicago, Ill. [25]Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport. Conn. [28]Bank of Republic, Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago, Ill. [33]Boettcher Newton & Co., Denver, Colo. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [38]McFetrick & Co., Montreal, Quebec. [39]Tobey and Kirk, New York. [40]Steiner, Rouse and Stroock, New York. [43]Jones, Heward & Co., Montreal, Que. [44]Tenney, Williams & Co., Los Angeles, Calif. [46]Stein Bros. & Boyce, Baltimore, Md. [47]Wise, Hobbs & Arnold, Boston. [48]E. W. Hays & Co., Louisville, Ky. [49]Blythe Witter & Co., Chicago, Ill.

INACTIVE ROCK PRODUCTS SECURITIES (Latest Available Quotations)

Stock	Price bid	Price asked
Atlantic Gypsum Products Co. 6's, 1941, $4,000 and 40 shs. com.[1]	35%	....
Atlantic Gypsum Products 6's, 1941, $5,000; 50 shs. com. as bonus[3]	49%	....
Consolidated Cem. com. v.t.c., 3220 shs.[1]	1½ per share	....
Indiana Limestone deb. 7's, 1936, wtih warrants ($1,000)[4]	$500 for the lot	....
Universal Gypsum com. trust ctfs., 800 shs.[2] (no par)	$5 for the lot	....
Universal Gypsum com., 300 shs.[2] (no par)	$6 for the lot	....

[1]Price at auction by Wise, Hobbs & Arnold, Boston, Dec. 18, 1929. [2]Price at auction by Adrian H. Muller & Son, New York, Dec. 18, 1929. [3]Price at auction by R. L. Day & Co., Boston, Dec. 18, 1929. [4]Price at auction by Adrian H. Muller & Son, Dec. 26, 1929.

Annual Financial Statement of Penn-Dixie Cement

PROFITS from operations, before interest and federal taxes, were $1,100,742 as compared with $2,237,384 for the previous year, and net profit available for dividends was $332,268, or $2.44 per share of preferred stock outstanding, as compared with $1,293,852, or $9.52 per share in 1928. Three quarterly dividends were paid during the year on the preferred stock, equal to $5.25 per share, and nothing was paid on the common stock.

Construction contracts awarded in the 37 eastern states were 13% less in 1929 than the previous year and cement consumption in 1929 was less than in any year since 1926. The company's volume of business was also less than the year before.

The decline in selling prices during the past five years culminated in a drastic reduction in August of 20 to 30 cents per barrel in the territories where the company operates. On September 30, 1929, the price received was 52 cents per barrel less than the average price received for the four years preceding 1927. However, during the last few weeks of the year selling prices had practically recovered the loss of the early fall, the greatest improvement being in the southeast, where the company's earnings had been most seriously affected.

Economy of operation has been maintained at the mills, it is reported. Notwithstanding reduced production, manufacturing costs were slightly less than in 1928 and lower than for any previous year. Plants were maintained in good condition and adequate depreciation and depletion charges were made during the year, amounting to $1,395,915. Capital expenditures for improvements, betterments, and extensions totaled $386,245. In the current year further improvements are contemplated which will strengthen the company's position and be reflected in reduced operating costs. Substantial savings were effected in administrative and selling expenses with increased efficiency.

CONSOLIDATED STATEMENT OF PROFIT AND LOSS AND SURPLUS OF THE PENN.-DIXIE CEMENT CORP. FOR THE YEAR ENDING DECEMBER 31, 1929

Net sales		$9,610,646.41
Manufacturing cost of sales (exclusive of depreciation and depletion) and all other expenses of operating, less miscellaneous income		7,113,988.63
		$2,496,657.78
Deduct—Provision for depreciation and depletion		1,395,915.60
Profits from operations		$1,100,742.18
Deduct:		
Interest charges	$706,175.00	
Provision for federal income taxes	62,298.73	
		768,473.73
Net profit for the year		$ 332,268.45
Add—Surplus balance to January 1, 1929, as per last accounts		2,315,464.32
		$2,647,732.77
Deduct—Dividends paid on preferred stock (to September 15, 1929)		711,574.50
Surplus at December 31, 1929, per balance sheet		$1,936,158.27

CONSOLIDATED BALANCE SHEET OF THE PENN.-DIXIE CEMENT CORP., DECEMBER 31, 1929

ASSETS

Current assets:			
Cash on hand and in banks		$ 2,987,263.84	
Notes and accounts receivable:			
Customers', less reserves		660,755.80	
Others		25,757.04	
Inventories of cement, work in process, raw materials and supplies, at cost or market, whichever is lower, as certified by responsible officials:			
Finished cement and process stocks		972,844.09	
Packages, fuel and general supplies		1,629,573.90	
			$ 6,276,194.67
Fixed assets:			
At reproduction cost, less depreciation, as appraised as of June 30, 1926, plus subsequent net additions at cost:			
Land, mineral reserves, buildings, machinery, equipment, etc.		$34,575,221.20	
Less—Reserves for depletion and depreciation		9,434,386.51	
			25,140,834.69
Miscellaneous investments, at cost			372,964.03
Insurance fund, invested in 550 shares of preferred stock of the corporation, at cost			41,230.00
Deferred charges to future operations			37,782.08
			$31,869,005.47

LIABILITIES

Current liabilities:			
Accounts payable		$ 206,449.40	
Accrued wages, interest, taxes, etc.		379,638.07	
Reserve for federal income taxes		98,767.48	
			$ 684,854.95
Reserves:			
Special reserve for property betterments and improvements, after charging losses on properties sold and dismantled		$ 26,316.04	
Miscellaneous operating reserves		68,876.21	
			95,192.25
First mortgage sinking fund 6% gold bonds, Series A, due September 15, 1941:			
Issued		$14,515,000.00	
Redeemed and canceled		1,211,000.00	
		$13,304,000.00	
Less—Bonds held in treasury		1,740,000.00	
			11,564,000.00
Capital stock and surplus:			
7% cumulative preferred stock:			
Authorized—200,000 shares of $100 each			
Issued—135,888 shares of $100 each (Series A convertible)		$13,588,800.00	
Note—Preferred dividends have been paid to September 15, 1929.			
Common stock of no par value:			
Authorized—1,000,000 shares. Issued—400,000 shares stated at		4,000,000.00	
Surplus as per statement attached:			
Balance of surplus provided at organization	$2,055,885.77		
Less—Deficiency in earned surplus	119,727.50	1,936,158.27	
			19,524,958.27
			$31,869,005.47

Sinking fund requirements during the year were fully met and in addition $225,000 par value of first mortgage bonds were purchased in anticipation of 1930 sinking fund requirements.

On April 1, 1929, absolute possession was obtained of the Pyramid plant at Des Moines, Iowa, which was previously purchased at the receiver's sale; and it is now being operated as Plant No. 8 of the corporation.

The balance sheet continues to reflect a strong condition. Cash December 31, 1929, amounted to $2,987,264 which was nearly double that of a year ago. Accounts and notes receivable are greatly reduced and inventories much lower than the previous year, with current ratio of more than 9 to 1. Net current assets, December 31, 1929, were equal to about one-half of outstanding bonds.

Imported cement, duty free, continues to seriously affect the company's profits from sales into seaboard territories where this competition forces selling below cost. The pending tariff bill as it passed the House carried a duty of 8 cents per hundred lb. which was concurred in by the finance committee of the Senate. However, on January 31, 1930, the Senate voted to leave cement on the free list. Figures put out by the U. S. Tariff Commission show that the difference between cost of foreign cement at seaports and domestic cost of production, plus freight to seaports and imputed interest, varies from 30 cents per bbl. at New York City to 87 cents per bbl. at Charleston, S. C., in favor of the foreign product.

Authorities generally agree that the lessened stock market demand for funds has had and will continue to have a favorable effect on construction generally by furnishing more and cheaper credit. While marked improvement may not occur for a few months, if reliable surveys and forecasts can be accepted, indications are for increased cement consumption later in the year from which the company is expected to benefit. Enlarged highway programs in certain states, augmented by increased appropriations for federal aid, constitute an additional favorable factor. With this improved demand, with the higher price levels now prevailing (although full benefit of this will not be felt until after contracts on the books taken at lower levels are shipped), and with the lowest manufacturing costs in the company's history, increased earnings in 1930 may be expected.

Pacific Coast Aggregates Earnings

NET PROFITS of Pacific Coast Aggregates, Inc., San Francisco, Calif., was $318,702 after charges but before depreciation and depletion.

Kentucky Consolidated Stone Company Report

E. W. HAYS AND CO., Louisville, Ky., dealers in the securities of the Kentucky Consolidated Stone Co., Louisville, Ky., have issued the following financial statement for the company:

CONDENSED STATEMENT OF INCOME AND EXPENSE OF THE KENTUCKY CONSOLIDATED STONE CO.
(For the period May 1, 1929, to January 31, 1930)

Stone sales	$744,091.69
Less discounts and allowances	2,507.08
Net sales	$741,584.61
Cost of production:	
Supervision	$ 39,408.94
Labor	228,540.02
Materials and supplies	127,131.85
Power and water	34,833.37
Direct overhead	41,090.78
Total operating cost	$471,004.96
Selling expense	$ 13,296.83
Administrative and general expense	50,525.20
Total selling and administrative cost	$63,822.03
Total production and selling cost	$534,826.99
	$206,757.62
Miscellaneous income	8,818.78
	$215,576.40
Increase in stone inventory	10,606.53
Profit before bond interest and expense, depreciation, depletion and federal income tax	$226,182.93
Interest, times earned:	
First mortgage 6½%, 1938	5.31
Dividend, times earned:	
7% cumulative preferred	5.20

Outstanding first mortgage 6½s now total $889,500, the company having retired $110,500 bonds through sinking fund operations to date. The company has already turned over funds to the trustees to retire $36,000 additional bonds anticipating the May 1, 1930, sinking fund, of which $10,000 face value have already been purchased.

As of January 2, 1930, there are outstanding 5522 shares of 7% cumulative preferred ($100 par) stock. The original issue was 6000 shares of preferred, 478 shares having been retired by the sinking fund operations.

By May 1, it is anticipated that approximately $200,000 of the preferred stock and the bonds of the company will have been retired since the organization of the company May 1, 1928.

As of January 31, 1930, current assets totaled $215,079.78 and current liabilities $38,660.14, a current ratio of 5.75:1. Net operating profit for the nine months' period of $226,182.93 equals 1.50 times the combined interest and preferred stock dividend requirements for the full fiscal year. The net profit on sales after all charges, including depreciation and federal income tax, is over 16%.

To date there has been set up for depreciation $207,305.52. The company shows a 25% increase in business for the first nine months of the fiscal year over the corresponding period of last year and will carry over into 1930 the greatest unfilled tonnage in its history. The fiscal year ending April 30, 1930, will show a 50% increase in net earnings available for the common stock over the corresponding period of last year. The company's accounting is most conservative, it being the policy to charge off a large percentage of replacements to operations. A considerable increase in net earnings from orders and contracts on hand is expected for the year 1930-31.

Blue Diamond Earnings

FOR THE year ended December 31, 1929, the Blue Diamond Co., Los Angeles, Calif., reports net income of $326,972 after charges but before federal taxes and amortization, equivalent to $16.33 a share on the 20,000 capital shares outstanding. This compares with $117,953 or $5.89 a share on the same capital in 1928.

Pacific Portland Cement Earnings in 1929

IN REPORT to stockholders R. B. Henderson, president of the Pacific Portland Cement Co., states that net profits for the year ended December 31 were equal after preferred dividends to $5 per share on the 82,500 shares of $100 par common outstanding. No public income statement or balance sheet is published by the company.

Although the volume of business done in 1929 was disappointing due to the fact that the nationwide reduction of building operations naturally affected the company, the proposed public building program scheduled for 1930 appears as a decidedly favorable indication for the coming year, according to company officials.

Missouri Portland Cement's Annual Statement

THE ANNUAL STATEMENT of the Missouri Portland Cement Co., St. Louis, Mo., at the close of business, December 31, 1929, contains the following data:

Land, buildings and equipment are stated at the depreciated book value of $6,942,308.25. Charges for additions to the property accounts, aggregating $177,110.09, it is stated, have been properly capitalized. Depreciation, in the amount of $422,742.45, and depletion of $12,592.32 have been charged to operations for the year 1929.

During the year the company turned over to a subsidiary company all land, plants and equipment pertaining to their sand, gravel and retail business in St. Louis and received therefor stock of subsidiary company. The stock of the subsidiary company is carried at the net book value of the properties turned over in payment therefor, plus $223,846.54, representing stock acquired for cash.

CONDENSED BALANCE SHEET OF THE MISSOURI PORTLAND CEMENT CO., DECEMBER 31, 1929

ASSETS

Capital assets					
Land, buildings and equipment—book values, less allowances for depreciation and depletion				$6,942,308.25	
Stock in subsidiary company				2,421,840.20	$ 9,364,148.45
Good will, trademarks, trade brands, trade names, etc.					1.00
Current					
Cash on hand and on deposit			$ 273,348.19		
Bank certificates of deposit			1,250,000.00	$1,523,348.19	
Customers' notes receivable				9,075.00	
Customers' accounts receivable, less allowances for doubtful, etc.				138,901.82	
Accrued income				12,519.90	
Inventory:					
Manufactured cement			$ 445,300.04		
Clinker (cement in process)			30,069.27		
Other merchandise			23,795.96		
Miscellaneous stores, supplies, etc.			371,404.02		
Cement sacks			229,513.54	1,100,082.83	2,783,927.74
Sundry notes, accounts, claims, etc.					96,618.36
Sundry securities					135,250.00
Deferred					49,118.02
					$12,429,063.57

LIABILITIES

Current					
Accounts payable				$ 95,589.03	
Accrued local taxes and sundry expenses				3,505.42	
Federal and state income taxes (estimated)				110,000.00	$ 209,094.45
Reserve for sack redemption					75,615.42
Other reserves					127,500.00
Capital stock and surplus					
Capital stock (authorized $9,000,000.00)					
Issued and outstanding, 299,284 shares				$7,482,100.00	
Surplus:					
Appropriated				1,500,000.00	
Unappropriated:					
Balance, December 31, 1928			$2,834,135.15		
Add: Net profit for the year ended December 31, 1929, including cash dividends from subsidiary company		$987,521.59			
Less:					
Cash dividends paid	$748,210.00				
Sundry adjustment	38,693.04	786,903.04	200,618.55	3,034,753.70	12,016,853.70
					$12,429,063.57

(Note A) The company's pro rata share of earnings of subsidiary company, for the ten months ended December 31, 1929, in excess of cash dividends received, if added to the net profit shown above, would result in the amount of $1,312,987.13, or the equivalent of $4.39 per share on 299,284 shares outstanding.

Alpha Portland's Annual Report

G. S. BROWN, president of the Alpha Portland Cement Co., in his annual report for the directors to the stockholders, says in part as follows:

The summary of income and surplus for the year 1929, given herewith, shows a very marked reduction in earnings for 1929 when compared with 1928. There are two reasons for this showing: first, Alpha shipments in 1929 were materially less than they were in 1928; second, the average price received for the product was considerably lower than in the former year.

Shipments for the United States in 1929 were 169,400,000 bbl. or about 3½% less than in 1928. However, this shortage of shipments was not uniform throughout the country, but varied in the districts where the Alpha company operates from 1.7% in Michigan to nearly 11% in the southeast district. Generally speaking, districts east of the Mississippi river and the Pacific coast districts showed smaller shipments, while the Kansas, Texas and Rocky Mountain districts showed a very nice increase. The reduction in the consumption of cement was, therefore, much greater than the average in the districts where Alpha operated. As was to be expected, competition, always vigorous in this industry, was if possible even more so during the year. Following a reduction in southern territory in August, a rather drastic reduction in prices was made in most of the balance of the territory where the Alpha company sells its cement. However, it appears that general sales conditions at this time are improving.

The tariff situation is still unsettled. The House of Representatives passed a tariff bill giving cement protection to the extent of 30.4 cents per barrel, but the Senate has just restored cement to the free list. There is still hope that when the bill gets into conference protection to the industry will be given.

The Alpha company's construction work started in 1928 has been completed. At this time the directors have authorized the installation of a 10,000 kw. turbine at Martins Creek No. 4 plant, and have also authorized considerable work at the Jamesville plant.

While a year ago it was felt that the outlook for 1929 was quite satisfactory, the year had not gone far until it was evident that the high cost of credit was having a very detrimental effect in regard to new construction. Operations of little magnitude could be financed only at exorbitant rates of interest. Many municipalities with work planned were unable to sell their bonds, with the result that it was held up and consumption of cement reduced. Much of this 1929 contemplated construction was merely postponed, and with the advent of lower interest rates it is confidently expected that much of it will be done in 1930. There are also heavy construction programs in government,

CONDENSED SUMMARY OF INCOME AND SURPLUS

(Years ended December 31, 1929 and 1928)

	1929	1928
Net sales	$11,368,969	$13,546,628
Operating expenses*	9,636,248	10,787,377
Profit from operations	$1,732,721	$2,759,251
Miscellaneous income, net	307,297	181,284
Net income for the year before provision for federal income taxes	$2,040,018	$2,940,535
Provision for federal income taxes (estimated)	225,000	355,000
Net income for the year	$1,815,018	$2,585,535
Surplus at beginning of the year	5,173,469	5,009,059
Gross surplus	$6,988,487	$7,594,594
Profit and loss charges:		
Dividends:		
On preferred capital stock	$140,000	$140,000
On common capital stock	2,133,000	2,044,125
Profit and loss adjustments	....	237,000
Total	$2,273,000	$2,421,125
Surplus at end of the year	$4,715,487	$5,173,469
*Including:		
Depreciation and depletion	$1,369,984	$1,267,539
Maintenance and repairs	1,203,141	1,103,205

CONDENSED CONSOLIDATED BALANCE SHEET

(December 31, 1929 and 1928)

ASSETS

Currents assets:	1929	1928
Cash	$2,914,835	$2,585,988
Call loans	2,600,000	2,800,000
U.S. Liberty Loan bonds, treasury certificates, etc., at cost	1,357,975	1,357,975
Working funds and advances	217,988	186,744
Accounts and notes receivable, deemed good and collectible	399,150	557,110
Inventories—Finished cement, clinker, sacks, materials and supplies (based on physical inventories and lower of cost or market)	2,895,380	3,103,271
Total current assets	$10,385,327	$10,591,089
Miscellaneous investments, at cost	$273,039	$212,166
Property:		
Land, buildings, machinery, equipment and coal mine lease	$33,058,658	$32,341,326
Less reserves for depreciation, depletion, etc.	11,125,664	9,788,556
Net property	$21,932,994	$22,552,771
Deferred items	$138,317	$112,062
Total	$32,729,678	$33,468,088

LIABILITIES

Current liabilities	1929	1928
Accounts payable	$328,950	$447,723
Wages payable	35,460	46,956
Federal income and general taxes (estimated)	268,061	404,475
Dividends payable January 15, 1930	533,250	533,250
Total current liabilities	$1,165,722	$1,432,403
Reserves:		
Compensation and other insurance	$599,731	$596,950
Miscellaneous	114,239	130,766
Total reserves	$713,969	$727,716
Capital stock:		
Preferred 7% cumulative (authorized and outstanding, 20,000 shares of $100 each)	$2,000,000	$2,000,000
Common — Without par value (authorized, 1,000,000 shares; issued and outstanding, 711,000 shares)	24,134,500	24,134,500
Total capital stock	$26,134,500	$26,134,500
Surplus	$4,715,487	$5,173,469
Total	$32,729,678	$33,468,083

utility and institutional lines. Therefore, unless some unforeseen difficulty intervenes, the consumption of cement in the territory that Alpha serves will not be less than in 1929, with the posibility it will be increased.

Though cost of production was reduced during the year, this reduction was not sufficient to offset the decrease in net price received.

For the third successive year the safety trophy of the Portland Cement Association for no lost-time accidents has been won by the Ironton plant. Ironton was also awarded by the Department of Commerce the *Sentinel of Safety* trophy in the non-metal mines division for 1928. The Bellevue plant for the second successive year has won the association trophy. There was a total of only 18 lost-time accidents at Alpha plants in 1929, the best record yet made.

In October, 1929, the 711,000 outstanding common shares of the Alpha company were listed on the New York Stock Exchange. In order to comply with the rules of the Exchange the annual meeting date of the stockholders was changed from January to April.

Black Marble and Lime Co. Bond Issue Authorized

SALE of a $125,000 bond issue of the Black Marble and Lime Co. of Enterprise, Ore., was authorized by Charles H. Bowen, Washington state supervisor of securities. The issue is in 7%, ten-year, first mortgage gold bonds.

The issue is to afford working capital for the company's operations in the Wallowa Mountains. A first mortgage on the company's properties, with a net value of $171,000, has been given to the United States Investment Co. of La Grande, Ore., as trustee. The company's available funds were depleted by a deficit of $45,743, resulting from four years of initial operations.—*Seattle* (Wash.) *Times.*

Medusa Portland Common Listed on Cleveland Exchange

THE Cleveland Stock Exchange has listed for trading 177,615 shares of no-par common stock of the Medusa Portland Cement Co., a company incorporated under West Virginia laws in 1892 as the Sandusky Cement Co. and changed to an Ohio corporation in 1900. In March, 1916, the name was changed to the Sandusky Cement Co. and the present name became effective in April, 1929.—*Cleveland* (Ohio) *Plain Dealer.*

Recent Dividends Announced

American Cyanamid com. (qu.)	40c.	Apr. 1
Cleveland Builders Supply & Brick com. (qu.)	50c.	Apr. 1
Lehigh P. C. pfd. (qu.)	$1.75	Apr. 1
Limestone Products Corp. of Amer. 7% pfd. (qu.)	1%	Apr. 1

Foreign Abstracts and Patent Review

Magnesium Carbonate and Magnesium Compounds from Magnesites. Dense, hard magnesite in lumps 6 to 18 in. in length is treated with 20% sulphuric acid under conditions such that mechanical disintegration is avoided. After the reaction has proceeded for some time the liquor is circulated through a strainer to remove silica, etc., and then through a series of tanks in which suspended particles of magnesium carbonate settle out and, after the addition of some fresh acid, is returned to the magnesite. The lumps are subsequently washed with magnesium sulphate solution under pressure to remove adhering magnesite particles.—*British Patent No.* 320,937.

Silico-Fluorides as Concrete Hardeners. The great solubility of zinc and magnesium silico-fluorides are among the desirable properties of these materials as concrete hardeners. They draw lime from the cement depositing hydrated silicic acid. Furthermore, nearly the entire content of sulphate in the cement enters in solution. These conditions were investigated quantitatively, and it was shown that the quantity of silico-fluoride added to the make-up water must be adjusted according to the free lime contained in the cement, if it is to decrease the permeability to water and to increase the compressive strength. Quantities of silico-fluorides in excess in relation to the free lime act destructively upon the constituents of the cement.—*Tonindustrie-Zeitung* (1930) **54,** 6.

Research on Hydrated Polycalcium Aluminates. Travers and Schnoutka have already indicated the preparation of the pure hydrated tricalcium aluminate $Al_2O_3 \cdot 3CaO \cdot 21H_2O$, crystallized in needles, starting from the solution of potassium aluminate and nitrate of lime. Investigations showed them that the zone of pH concentration, in which these crystals precipitate in a pure state, is very limited, and amounts to between pH 11.57 and pH 11.62. If the medium is more alkaline, distinctly different shapes of crystals are observed. Between pH 11.62 and pH 11.79 there results crystals grouped in spherolites analogous to those indicated by Le Chatelier; between pH 11.79 and pH 11.89 there are formed exclusively crystals which are characteristically hexagonal, analogous to those described by Allen and Rogers. Finally, beyond pH 11.89 there is observed at times the formation of hexagonous crystals, and of rhombohedrons of lime $[Ca(OH)_2]$.

On analysis of these various kinds of crystals, which are possible in a single phase, and by placing them in the exact conditions indicated, it was found that they all contain more lime than tricalcium aluminate and that the proportion of lime can vary from 3 to 4 CaO per 1 Al_2O_3, *despite identity of crystalline form.* The spherolites of Le Chatelier have an exact composition of $Al_2O_3 \cdot 3.75CaO$, this authority giving them, however, the formula of tetra calcium aluminate.

In fact, preparations have been obtained where the composition closely approached the latter. The variation of the proportion of lime, with an identical crystal form, led to the belief that these are solid solutions of lime and of an aluminate of lime. Experience has shown, however, that with constant temperature, and different compositions of sea water, the crystals have different contents.

On rapid leaching with N/10 HCl the lime is dissolved quicker than the aluminate, so that at the end of a number of leachings the residue always corresponds to the composition of the existing aluminate, and finally the residue itself may be entirely dissolved.

Constructing a diagram, in which the ordinates are the lime dissolved in a given leaching, and the abscissas the alumina dissolved in the same test, it is found that the points representative of the part attacked are along a straight line having as angular coefficient the one of tricalcium aluminate, whatever be the crystalline form studied (spherolites or hexagonals). Therefore it is evident that we are concerned with the solid solution of $Ca(OH)_2$ in hydrated tricalcium aluminate.

According to the pH concentration of the solution, the aluminate or the lime have their own respective crystalline systems.

These tests make doubtful the existence of the hydrated bicalcium aluminate described by Allen and Rogers and by Lafuma. Though the actual hydrate $Al_2O_3 \cdot 2H_2O$ has been made, the bauxite detected in the analysis by X-rays and in the thermal analysis, is a mixture of $Al_2O_3 \cdot H_2O$ and of $Al_2O_3 \cdot 3H_2O$ and not the hydrate with two molecules of water. The study of the proportion of these hydrated aluminates (action of water, of salts, etc.) is of a very great importance by reason of application to the alumina cements.—*Ciment* (1929) **34,** 8.

Colored Cements. Colored hydraulic cements are made by fusing a base of portland cement or aluminous cement together with metallic oxides, carbonates or other salts. A small proportion of fluxing material may also be added. The raw materials and coloring matter are ground to pass a 200-mesh sieve before fusion and then the fused cement mix is run into molds and ground. Ferrous and ferric oxides, oxides of copper and cobalt, salts of iron, copper, manganese, cobalt and chromium and earth pigments such as ochre, bole, sepia and brown umber can be used for color matter. In some cases a finely ground metal may be added to overcome the effects of the caustic lime on the color.—*British Patent No.* 320,597.

New Foreign Books on Rock Products.

Lime as a Protection for Plants (Kalk als Pflanzenschutzmittel) — B. Prof. Dr. G. Korff, 1929, Berlin, Kalkverlag, 32 pp. Price 1 R.M.

Directions for Mortar and Concrete (Anweisungen fuer Moertel und Beton)—1929, Berlin, Ernst and Sohn, 71 pp. Price 4.50 R.M.

Lime Hand Book for 1930 (Kalk-Taschenbuch, 1930). This edition (Kalkverlag, Berlin, price 1.25 R.M.) contains a number of articles relative to the uses of lime, including "Limestone as a Food" and "Fighting Insect Pests with Lime." Four brief articles deal with special applications of lime in the building industries. One article deals with "The Choice of Fuel for Lime Burning." A number of tables are included in the volume. — *Tonindustrie-Zeitung* (1930), 54.

Glazed Concrete Products. The use is claimed of solutions containing magnesium and calcium chlorides, sodium or potassium silicate and aluminium sulphate or an alkali aluminium sulphate, with or without the addition of magnesium sulphate.—*British Patent No.* 299,427.

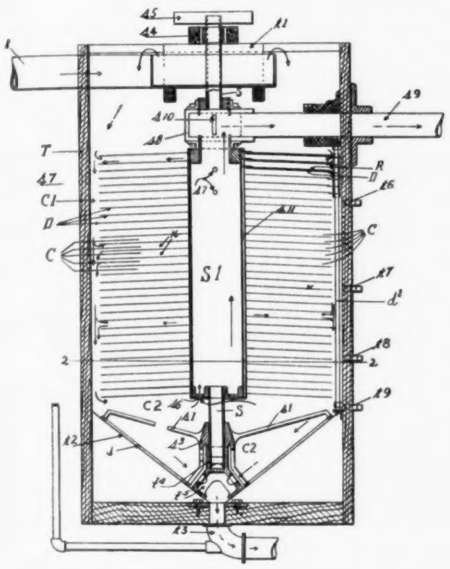
Manufacture of Alumina by a Wet Process. Interaction in solution of lime and bauxite in the proportions $Al_2O_3 \cdot 4CaO$ for 1½—8 hrs. at 55 to 115 lb./in.^{2} pressure in the autoclave, followed by treatment with sodium carbonate filtration of the sodium aluminate, and precipitation with carbon dioxide, gives a 90% yield of iron-free alumina containing 0.15—3% SiO_2 There is evidence for the formation in the autoclave of the compound $Al_2O_3 \cdot 3CaO$. Low silica contents are insured by the absence of free alkali before the carbonate treatment. The precipitate of ferruginous calcium carbonate is suitable for inclusion in portland cement pastes. *Comp. Rend.* (1929), **189,** 1276.

Magnesia from Dolomites. Dolomite is calcined and heated with ammonium salts, the quantity of these salts being such that they are entirely decomposed by the CaO of the dolomite. The unchanged MgO is afterwards separated from the Ca salts. *French Patent* No. 664,902.

Recent Process Patents

The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Superintendent of Documents, Government Printing Office, Washington, for each patent desired.

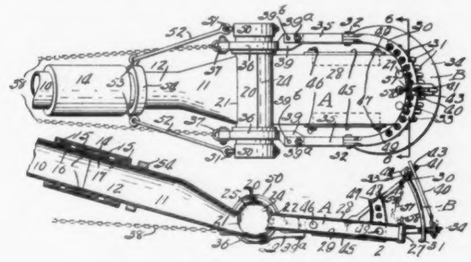
Settling Process. A new device for separating finely divided solids from a liquid takes advantage of the facts that such solids settle quickly in shallow depths and that a thickened sludge may be thrown off by cen-



Method of separating solids from a liquid

trifugal force from a rotating disk. It consists of a tall circular tank in the center of which is a hollow revolving shaft carrying flat disks. The feed enters at the top and flows down between the side of the tank and the edges of the disks. The spaces between the disks are connected with the niterior of the shaft by small holes through which clear liquid escapes. The solids settle on the disk and are thrown off by centrifugal action. The inventor claims that the masses of settled solids from the upper disks induce the flocculation and settling of the solids below, the settling and throwing off being repeated and the pulp going to the discharge getting thicker constantly. The clear liquid goes out through a pipe at the top to which the hollow shaft is connected by a stuffing box and a thickened sludge escapes below. A pipe shown provides liquid to carry the sludge away when it is too thick to flow readily. The idea is to provide a very large settling area in a compact form.—*C. H. Nordell,* U. S. No. 1,718,871.

Separating Dredge Suction. A dredge suction has a rake and a flattened mouthpiece. Both these are adjustable, the purpose being to set them so that material of unwanted size is left behind. A combina-

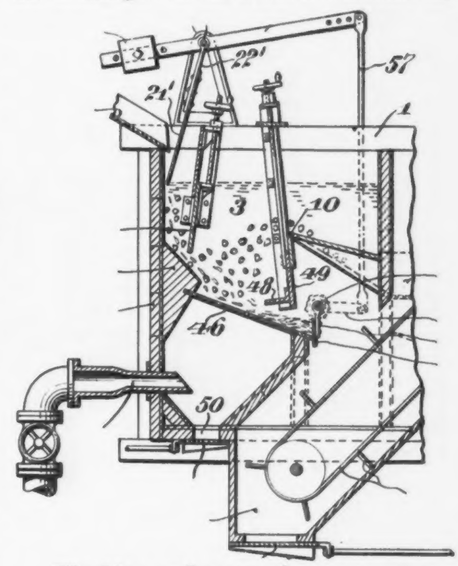


Separating dredge suction

tion with the rake set low and the mouth high will take in the coarser gravel and leave most of the sand behind but with the mouth close to the bottom almost all the material will be taken. Bars across the mouthpiece prevent too large stones from entering.—*H. L. Shotwell,* U. S. No. 1,729,054.

Washer. A recent washer invented for washing coal could be used for washing and separating gravel and stone. The feed comes in at the top and passes under a baffle and over a grating or perforated plate. Water under pressure flows upwardly through this grating or perforated plate and makes the separation. The heavier solids pass under a breast plate and the lighter solids go over it. The heavier solids are pulled out by a drag while the lighter solids flow away by gravity. The position of the breast plate and baffle and the pressure of the water are all adjustable so that the separation may be controlled.

Three forms of the invention are shown and each has a special method for regulating the discharge. In the form shown here the

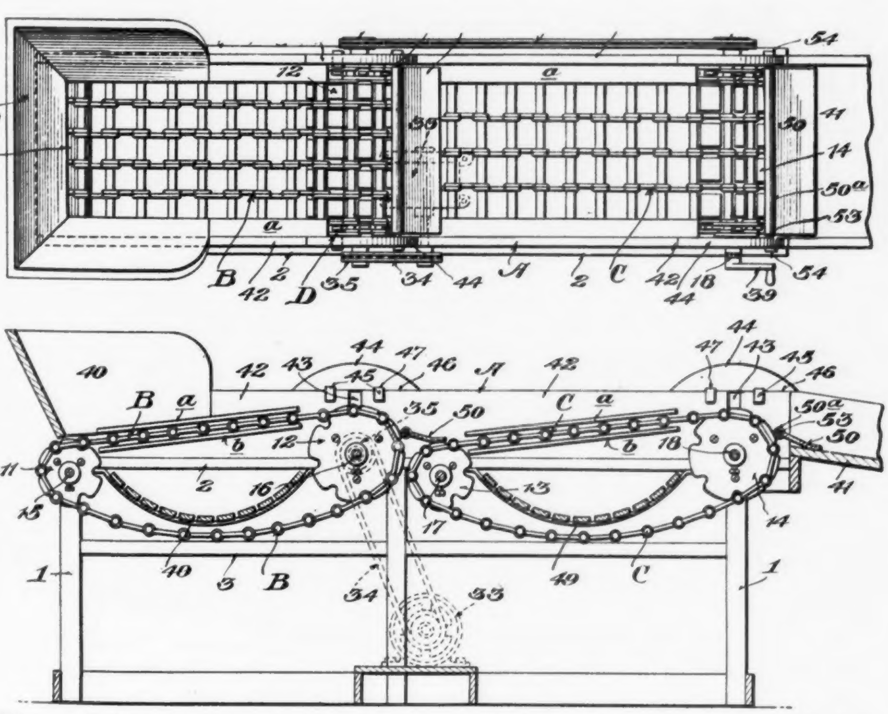


Washing and separating apparatus

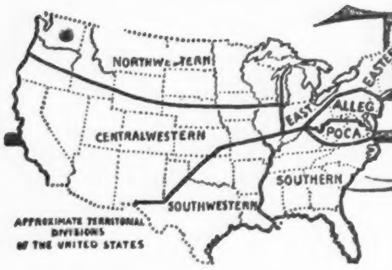
discharge of heavy solids to the drag is through a gate that is controlled by a lever system. This is actuated by the feed striking a plate and a counterweight may be set so that there is no discharge except when a mixture of solids and liquids strikes the plate.—*F. H. Blatch,* U. S. No. 1,714,492.

Lime Process of Ripening Sugar Cane. The growth of the stalks are artificially checked with the consequent ripening of the cane by treating the tops of the still growing plants with a spray comprising dry powdered lime in slaked or unslaked condition. Lime dust is the preferred ingredient because it also has a beneficial effect on the soil. *D. P. J. Burguieres,* U. S. Patent No. 1,746,190.

Sizing Device. The invention described is intended particularly to grade fruit by sizing but properly proportioned it could be used for sizing crushed stone or gravel. It consists of one or more traveling link screens with aprons for transfer and the necessary arrangements for allowing oversize and undersize to flow away by gravity. A special feature is the form of apron which receives the oversize so that it is not caught between the apron and the traveling screen or carried down to be caught between the screen and the sprockets.—*J. D. Grabill,* U. S. No. 1,715,197.



Plan and side elevations of sizing device adaptable to the rock products industry



Traffic and Transportation

Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

District	Limestone Flux Week ended Feb. 8	Feb. 15	Sand, Stone and Gravel Week ended Feb. 8	Feb. 15
Eastern	2,110	2,089	1,911	2,037
Allegheny	2,222	2,318	2,567	2,241
Pocahontas	174	150	438	465
Southern	564	577	5,371	6,380
Northwestern	520	557	858	947
Central Western	480	512	5,075	5,761
Southwestern	297	329	3,420	4,303
Total	6,367	6,532	19,640	22,134

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1929 AND 1930

District	Limestone Flux 1929 Period to date Feb. 16	1930 Feb. 15	Sand, Stone and Gravel 1929 Period to date Feb. 16	1930 Feb. 15
Eastern	14,633	13,187	11,433	11,558
Allegheny	18,659	15,024	12,964	15,466
Pocahontas	822	1,190	2,048	3,132
Southern	2,977	3,559	44,628	37,420
Northwestern	3,468	2,998	4,642	5,418
Central Western	2,963	3,059	33,218	30,769
Southwestern	2,533	2,008	28,757	21,664
Total	46,055	41,025	137,690	125,427

COMPARATIVE TOTAL LOADINGS, 1929 AND 1930

	1929	*1930*
Limestone flux	***46,055***	***41,025***
Sand, stone, gravel	***137,690***	***125,427***

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning March 8:

SOUTHERN FREIGHT ASSOCIATION DOCKET

49334. **Sand, gravel, slag, etc.**, between Manistee and Repton R. R. stations and Alabama points. It is proposed to amend Agent Glenn's Alabama Commodity Tariff, I. C. C. A651, Rate Table 29, Supplement "J," by revising rates on sand, gravel, slag, etc., as described in Item 165 of the above-named tariff, between M. & R. R. R. stations and all points in Alabama covered by the tariff in question (intrastate) to basis of trunk line scales. (Reductions.)

49378. **Sand and gravel**, from Gravel Pit, N. C., to Corapeake Junction, Hickory Ground, Northwest and St. Brides, Va.—Cancellation. It is proposed to cancel, on the obsolete theory, the commodity rate of 160c per net ton on sand and gravel, carloads, from and to above named points, as published in N. S. R. R. I. C. C. A137.

49395. **Stone, marble, calcite, limestone, etc.**, from points in Georgia, Alabama, Tennessee, and from Kinsey, N. C., to New Philadelphia, O. It is proposed to establish commodity rates on stone, marble, calcite, limestone, slate or whitestone, carloads, as described in Item 359A, Agent Glenn's I. C. C. A657, from Tate, Whitestone, Mineral Bluff, Ga., Kinsey, N. C., Cartersville, Fairmount, Boliver, Ga., Tellico Plains, Louisville, Marmor, Pinkmar, Kingsley, Pickford, Knoxville, Concord, Tenn., Brownson and Gantt's Quarry, Ala., to New Philadelphia, O., the same as in effect to Mineral City, O.

49398. **Crushed stone**, from Bon Aqua, Tenn., to points in West Tennessee. It is proposed to establish rates on **stone, crushed**, carloads (See Note 3), from Bon Aqua, Tenn., to points in West Tennessee on the N. C. & St. L. Ry., I. C. R. R., M. & O. R. R. and G. & M. N. R. R., the same as at present applicable from Newsom, Tenn. The proposed rates to be confined to intrastate application. Present and proposed rates to representative destinations are as follows, rates in cents per net ton:

To	Pres.	Prop.	To	Pres.	Prop.
Bells	162	124	Deansburg	151	113
Humboldt	173	135	Middleton	151	113
Tiptonville	183	158	Brooksdale	162	124
Trenton	173	135			

49406. **Sand, gravel, slag, stone, chert**, carloads, between southern points; commodity description. It is proposed to amend the description published in Agent Glenn's Freight Tariff 88A, I. C. C. A655, and Freight Tariff 108, I. C. C. A668, on sand, gravel, etc., between points in southern territory, to read as follows: "Road aggregates and building material (not ground, pulverized or processed, other than washed), in bulk (see note), viz., gravel, crushed stone, slag, rubble stone, broken stone or chert; sand, common (not ground, pulverized or processed, other than washed), in bulk (see note), in straight or mixed carloads (See Note 3). Note—Applicable on commodities named that can be transported in open-top cars without risk of damage from the weather.

49414. **Silica sand**, from Ottawa, Ill., to Nashville, Tenn., Atlanta, Elberton and Macon, Ga. It is proposed to establish through rates on silica sand, ground or pulverized, carloads (See Note 3), from and to above named points, on basis of lowest combination. Proposed rates are as follows: To Nashville, Tenn., 370c; Atlanta, Ga. 450c; Elberton, Ga., 465c, and to Macon, Ga., 465c per net ton.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

49446. **Sand and gravel**, from Montgomery, Ala., to Louisiana points west of the Mississippi river. Combination rates apply. Proposed rates on sand and gravel, in straight or mixed carloads (See Note 3), from Montgomery, Ala., to points in Louisiana west of the Mississippi river, 8½% of Column 100 rates as published in Southwestern Lines Tariff 154, I. C. C. 2011.

SOUTHWESTERN FREIGHT BUREAU DOCKET

19588. **Phosphate rock**, from Pensacola, Fla., to Little Rock, Ark. To establish a rate of 24½c per 100 lb. (rate to apply only on import and coastwise traffic and to apply from shipside) on phosphate rock, carloads, description and minimum weight as per Item No. 3050 of S. W. L. Tariff No. 82-F, from Pensacola, Fla., to Little Rock, Ark. The usual basis from import rates from Pensacola, Fla., to this territory is the same as from the other Gulf ports, and in order that Pensacola may be on a parity with New Orleans, Mobile and Gulfport, it is proposed to establish the above rate.

19604. **Silica, crushed or ground**, from Rogers, Ark., to interstate points. To establish the following rates in cents per 100 lb. on silica, crushed or ground, carloads (See Note 3), from Rogers, Ark., to points shown below:

To	Rate	To	Rate
Okla. City, Okla.	12½	St. Louis, Mo.	13½
Tulsa, Okla.	10	Chicago, Ill.	18½
Kansas City, Mo.	11	Cincinnati, O.	19½

The basis for the proposed rate, it is stated, is 9½% of the I. C. C. Docket 13535 first class, for the distance traversed (not short line). Rates on this commodity are now before the Interstate Commerce Commission in I. C. C. Docket 17000, parts 11 and 11A, but there is an immediate necessity for rates between these particular points.

TRUNK LINE ASSOCIATION DOCKET

23009. **Ground limestone**, carloads, minimum weight 50,000 lb., from Texas and Cockeysville, Md., to Ralston, Penn., to Canandaigua, N. Y., 16c per 100 lb. Present rate, 10c per 100 lb. Reason—Present rates are result of printer's error and it is desired to place rate on proper basis, also to eliminate fourth section departures.

23017. **Gravel and sand** (other than blast, engine, foundry, glass, molding or silica), carloads (See Note 2), from Portland and Mt. Bethel, Penn., to Bath, Penn., 70c per net ton. (Present rate 80c per net ton.) Reason—Rate same as authorized in P. S. C.-Penn. Docket 7530, Lycoming Sand and Gravel Co. complaint, for distance involved.

23023. **Crude fluxing limestone**, carloads (See Note 2), from Bellefonte and Tyrone Forge, Penn., to Du Bois, Penn., $1.26 per gross ton. (Present rate $1.44 per gross ton from Bellefonte, Penn., and 25½c per 100 lb., from Tyronne Forge, Penn.) Reason—Rates comparable with others in the same general territory involving like movements.

23032. **Sand and gravel**, carloads (See Note 2), from Kenvil, N. J., to Palmerton and Aquashicola, Penn., $1.15 per net ton (present rate $1.25 per net ton). Reason—Rate comparable with rates from contiguous shipping points involving like distances.

23037. **Sand**, other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads (See Note 2), from Reading, Penn., to Pennhurst, Penn., 90c per net ton. (Present rate, $1.40 per net ton.) Reason—Rate compares favorably with others' involving similar hauls.

23039. **Stone, crushed**, carloads (See Note 2), from White Haven, Penn., to Burnwood, Ararat and Thompson, Penn., $1.40 per net ton. Reason—Rate comparable with rates between other points in the same general territory.

23040. **Sand and gravel**, carloads, from Pinewald, Quail Run and Toms River, N. J., to Wildwood and Holly Beach, N. J., $1.20 per net ton. (Present rate, $1.96 per net ton.) Reason—Rate comparable with rates from other shipping points in the same general territory.

23046. Cancel commodity rate of 7½c per 100 lb. on **sand, burnt waste**, carloads (See Note 1), from West Newton, Penn., to Cleveland, O., and apply class rate in lieu thereof. Reason—There has been no movement of traffic under this rate for several years and no prospects for such movements.

23051. **Crushed stone**, carloads (See Note 2). Proposed rates in cents per net ton:

From	To Lenhartsville, Penn.	Trexler, Penn.
Alburtis, Penn.	90	90
Birdsboro, Penn.	80	85
Trap Rock, Penn.	80	85
Laureldale, Penn.	75	75
Reading, Penn.	75	80
Stowe, Penn.	85	90
Tuckerton, Penn.	80	80

Reason—Rates comparable with others involving similar movements.

23066. **To cancel rates on stone, viz., fire and ganister**, carloads (See Note 2), from Agent Curlett's Westbound Tariff I. C. C. A265 shown in Items 6885B, 6890A, 6900A and 6905A, to various Pennsylvania points, account no routes being shown in the commodity tariff or the routing guide, as the rates in question are published in local P. R. R. tariffs. Statement of canceled rates to be furnished upon request.

23074. **Sand and gravel**, carloads (See Note 2), from all stations on R. R. R. R. and Pinewald, Quail Run and Toms River, N. J., to Ramapo, N. Y., $2.20 per net ton in open-top equipment and $2.40 per net ton in box cars. Reason—Rates comparable with others to contiguous destination point.

23080. **Crushed stone**, carloads (See Note 2), from Blue Mount, Md., to Pennsylvania points:

	Prop.	Pres.		Prop.	Pres.
Rockburn	80	90	Stoner	85	90
Stony Creek	80	90	Strickler	85	90
Campbell	80	90	Wrightsville	85	90
Hellam	85	90	Emigsville	80	90

The above rates in cents per net ton. Reason—Rates comparable with others involving like movements.

23088. **Sand** (other than blast, engine, foundry, molding, glass, silica, quartz or silex), carloads, **and/or gravel**, carloads (See Note 2), from Carpenterville, N. J., to Snyders, Penn., $1.25 per net ton. (Present rate, $2.30 per net ton.) Reason—Rate comparable with rate in the same general territory involving **like hauls.**

23102. **Ganister stone**, carloads (See Note 2), from Three Springs, Penn., to Niagara Falls, N.Y.,

$2.60 per net ton. Reason—Proposed rate is comparable with rates from Mt. Union, Madley and Berkeley Springs, Penn.

CENTRAL FREIGHT ASSOCIATION DOCKET

24076. To establish on **sand, core,** carloads, from Kankakee, West Kankakee, Greenwich and Van's Siding, Ill., to points in Indiana and Ohio, rates as shown below. Present and proposed rates:

	Prop. rate	Pres. rate
Alexandria, Ind.	170	18
Anderson, Ind.	170	18½
Brazil, Ind.	164	17
Decatur, Ind.	180	19½
Elkhart, Ind.	160	16
Ft. Wayne, Ind.	180	18
Frankfort, Ind.	150	15
Kendallville, Ind.	180	18
Kokomo, Ind.	165	16½
Logansport, Ind.	150	15
Marion, Ind.	170	17
Mishawaka, Ind.	150	15
Montpelier, Ind.	180	19½
Muncie, Ind.	180	18½
Wabash, Ind.	170	17
Warsaw, Ind.	160	16
Cincinnati, O.	210	21½
Dayton, O.	220	22
Springfield, O.	220	22
Hamilton, O.	210	21½
Middletown, O.	220	22

24081. To establish on **crushed stone,** carloads, from Lewisburg, O., to Centerville, O., rate of 80c per net ton. Route: Via Cincinnati Northern R. R., West Manchester, O., and Penna. R. R. Present, 13c.

24088. To establish on **crushed stone,** carloads, from Thrifton, O., to Russellville, O., rate of $1.30 per net ton. Present rate, $1.40 per net ton.

24089. To establish on **sand and gravel,** carloads, from Wapakoneta, O., to Continental, O., rate of 85c per net ton. Present rate, 11½c.

24103. To establish on **dolomite, raw or crude,** and **stone, fluxing,** carloads (See Note 3), from Plum Run, O., to Cincinnati, O. (See note), rate of $1.01 per ton of 2000 lb.

Note—Rate will include delivery to points located in Cincinnati switching district as named in C. F. A. L. Tariff I. C. C. 2234, the N. & W. Ry. absorbing switching charges of connecting lines.

Route—Via N. & W. Ry. direct. Present rate, 15c per 100 lb. or $3 per ton of 2000 lb.

24111. To establish on **sand and gravel,** carloads, from Lafayette, Ind., to points in Illinois and Indiana, rates as shown below:

To	From Lafayette, Ind. Pres. rate	Proposed sand	Rate gravel
Chicago Heights, Ill.	*	90	98
Momence, Ill.	*	90	98
St. Anne, Ill.	*	90	94
Papineau, Ill.	*	90	94
Watseka, Ill.	*	90	94
Milford, Ill.	*	90	94
Rossville, Ill.	*	80	80
Judyville, Ill.	*	86	86
Alvin, Ill.	*	80	80
Danville, Ill.	*	80	80
Terre Haute, Ind.	*	115	115
Bryce, Ill.	*	94	94
Cissna Park, Ill.	*	94	94
Fountain Creek, Ill.	*	90	90
Reilly, Ill.	*	90	90
Ellis, Ill.	*	94	94
Glover, Ill.	*	94	94
Villa Grove, Ill.	*	94	94

*Classification basis is applied.

24075. To establish on **crushed stone,** carloads, from Kenton, O., to Maitland, O., and from Marion, O., to Dayton, Lima, Maitland, Ohio City and Wren, O., rates as shown below. Present and proposed rates:

To	From Marion, O. Pres. rate	Prop. rate
Dayton, O.	80c N. T.	70c N. T.
Lima, O.	90c N. T.	70c N. T.
Maitland, O.	70c N. T.	60c N. T.
Ohio City, O.	14c Cwt.	80c N. T.
Wren, O.	15c Cwt.	90c N. T.

To	From Kenton, O. Pres. rate	Prop. rate
Maitland, O.	80c N. T.	70c N. T.

24142. To establish on **sand and gravel,** carloads, from Hamilton, O., to Centerville, O., rate of 80c per net ton. Present rate, 12c.

24143. To establish on **sand and gravel,** carloads, from Toledo, O., to Ironton, O., rate of $1.65 per net ton. Present rate, $1.80 per ton.

24188. To establish on **agricultural limestone,** in box cars, carloads, minimum weight 60,000 lb., from Carey, O., to points in Indiana, rates as shown below.

To	Pres.	Prop.*	To	Pres.	Prop.*
Alida	2.50	2.30	Magee	2.50	2.20
Belfast	2.50	2.30	Milford Jct.	2.20	2.00
Columbia City	2.00	1.90	N. Liberty	2.40	2.00
Griffith	2.60	2.40	Plymouth	2.20	2.00
Hartsdale	2.60	2.40	Stroh	2.00	1.90
			S. Whitely	2.00	1.90
Howe	2.20	1.90	Valparaiso	2.50	2.30
Kendallville	2.00	1.80	Waterloo	2.00	1.60
Knox	2.30	2.20	Westville	2.50	2.30
La Grange	2.20	1.90	Wilders	2.50	2.30
La Paz Jct.	2.20	2.00			

*Genoa-Martin Group commodity rate, with Carey agricultural lime rate as maximum.

24190. To establish on **core sand,** carloads, from Juniata, Mich., to Oshawa, Ont., rate of $3.61 per net ton. Present rate, $6.70 per net ton.

24191. To establish on **core sand,** carloads, from Juniata, Mich., to South Bend, Ind., rate of $2.14 per net ton. Present rate, $2.27 per net ton.

24192. To establish on **sand (bank, river and/or torpedo) and/or gravel,** carloads, from Dickason and Dickason Pit, Ind., to various destinations in Illinois for joint line hauls, commodity rates as shown in Exhibit C, attached. Present—There are at present no joint rates in effect; combination of intermediate rates apply.

EXHIBIT C

Proposed rates from Dickason, Dickason Pit, Ind., stations, to representative Illinois destinations:

B. & O. R. R.			
Decatur	76		
C. C. C. & St. L. R. R.			
Bloomington	95	Ridge Farm	80
Chrisman	80	Urbana	80
Hillery	70	Windsor	100
Marshall	80		
C. M. St. P. & P. R. R.			
Cheneyville	101	Tallmadge	113
Stockland	101		
I. C. R. R.			
Arcola	92	Logge	92
Clinton	105	Neoga	92
Gibson City	92	Rantoul	83
Hervey City	92	Tolono	92
I. T. R. R.			
Clinton	101	Monticello	98
N. Y. C. R. R.			
Delmar	105		
N. K. P. (L. E. & W.)			
Bloomington	101	Paxton	76
Hoopeston	76		
N. K. P. (T. St. L. & W.)			
Brocton	80	Ridge Farm	70
Metcalf	75	Stewardson	101
Pennsylvania R. R.			
Arcola	101	Lovington	101
Effingham	101	Paris	80
Wabash R. R.			
Bement	88	Shumway	115
Fairbury	118	Sidney	80
Homer	80	Urbana	85
Mansfield	88	Windsor	110
Y. S. L. R. R.			
Yale	101		

24195. To establish on **crushed stone, carloads,** from Greencastle, Ind., to Cass and Gilmore, Ind., rate of 85c per net ton. Present rate, 99c per net ton.

24196. To establish on **agricultural limestone** (refuse lime), in bulk, carloads, from Milltown, Ind., to Indianapolis, Ind., rate of 120c per net ton. Present rate, 18c.

24199. To cancel rate of $1.13 per ton of 2000 lb. applying on **sand, foundry, burnt or refuse,** carloads, from Cleveland, O., to Sandusky, O., as published in Item 685, B. & O. I. C. C. 21528, applying in lieu thereof rates published in B. & O. Freight Tariff 1935, Ohio No. 5590, applicable on sand (all kinds), will apply, i.e., 90c per ton of 2000 lb. when shipped in open-top equipment, and rate of $1.04 per ton of 2000 lb. when shipped in box cars.

24208. To establish on **fluxing limestone,** carloads, from Bedford, Martinsburg and Fairport, Ind., to points in Ohio, rates as shown below:

To	Proposed rates from Bedford	Martinsburg	Fairport
Mansfield, O.	1.76	......	1.01
Massillon, O.	1.96	1.96	.90
Canton, O.	1.96	1.96	.90
Youngstown, O.	2.06	1.76	.80

Present rate, $2.39 per gross ton.

24209. To establish on **molding sand,** carloads, from Delphos, O., to Bedford, Ind., rate of $1.76 per net ton. Present rate, $2.02 per net ton.

24212. To establish on **sand and gravel,** in open-top cars, carloads, from South Lebanon, O., to destinations on the C. C. C. & St. L. Ry. in Ohio, rates as shown below. C. C. C. & St. L. destinations. Present rates, classification basis.

To	Prop.	To	Prop.
Franklin	80	Gano	80
Monroe	80	Sharonville	80
Kyles	80	Valley Junction	85
Hughes	80	White Water Park	85
Mauds	80	Simonson	85
West Chester	80	Harrison	90

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

19133. To cancel commodity rates of 14½c on **sand, silica,** from Cheshire, Mass., to Millbury, Mass., as published in Item 1580 of B. & A. I. C. C. 9091 and apply in lieu thereof sixth class rate of 18c as named in B. & A. I. C. C. 8666. Reason—To cancel obsolete commodity rate.

ILLINOIS FREIGHT ASSOCIATION DOCKET

4956. **Molding sand,** carloads (See Note 1), from Bowes, Ill., to Joliet, Ill. Present—Class. Proposed—88c per net ton.

4956. **Molding sand,** carloads (See Note 1), from Bowes, Ill. Rates per ton of 2000 lb.

To—	Present	Proposed
Freeport, Ill.	Class	$1.00
Dixon, Ill.	Class	1.26
Galena, Ill.	Class	1.26

5491. **Limestone, crushed or ground,** carloads, minimum weight 40,000 lb., from Quincy, Ill., to Dubuque, Ia. Present—15½c; proposed, 9½c.

5502. **Sand, viz., lake, river and bank,** other than sand loam (See Note 3), from Gary, Calumet and Willow Creek, Ind., to Hoopeston, Ill. Present—$1.64 per net ton. Proposed—$1.39 per net ton.

WESTERN TRUNK LINE DOCKET

6025B. **Limestone, agricultural,** from Valmeyer, Ill., to stations in Missouri on the Wabash R. R. Present rates, combination on East St. Louis or St. Louis.

To	Miles	Pres.	Prop.
Normandy, Mo.	36.5	1.08	.80
St. Charles, Mo.	50.2	1.41	.85
O'Fallon, Mo.	63.3	1.41	.90
Wellsville, Mo.	116.8	1.54	1.20
Mexico, Mo.	137.0	1.66	1.30
Moberly, Mo.	175.0	2.45	1.45
Macon, Mo.	197.6	2.57	1.55

Injunction Denied on Georgia Intrastate Rates on Gravel

APPLICATION of the Georgia Public Service Commission for an interlocutory injunction against enforcement of certain sand, gravel and clay freight rates in intrastate shipments was refused recently by a special court of three federal judges. The minima rates were prescribed by the Interstate Commerce Commission as a nondiscriminatory order.

Judge Samuel Sibley of Atlanta, who heard the case with Circuit Judge H. P. Bryan and District Judge Wayne G. Borah, said the written opinion probably would be issued soon and sent immediately to Atlanta; this action will be done to allow the Georgia commission to enter an appeal before the new schedule of rates is effective—*Augusta* (Ga.) *Chronicle.*

Increase Limestone Rate to Youngstown

EFFECTIVE March 13, the railroad rate on furnace or foundry limestone, in carloads, from Hillsville, Shaw Junction and Walford, Pa., to the Youngstown district will be increased to 55 cents a gross ton from the present rate of 42 cents.

The Interstate Commerce Commission, in a decision made public recently, held that the proposed increased rate by the Pennsylvania and Pittsburgh & Lake Erie railroads was justified. The 42 cent rate went into effect on August 25, 1928. For about five years prior to that date the rate was 55 cents, which the railroads have been successful in having restored over the protests of steelmakers and other interests in the Mahoning Valley.

The commission also disallowed the request of Youngstown receivers of limestone for a different rate than that given to Woodlawn, Penn., more than 40 miles, or three times farther from the quarries than Youngstown furnaces using the stone.

Missouri-Kansas Rate Hearing on Sand, Gravel and Crushed Stone

THE Hoch-Smith investigation into the rates on sand, gravel, crushed stone and related articles from and to points in Kansas and Missouri and between those states and Oklahoma and Arkansas, was heard by Examiner E. H. Waters, of the Interstate Commerce Commission, and members of the Missouri, Kansas and Arkansas state commissions in Kansas City during the week beginning February 10. The hearing required the entire week, and night sessions were held every night but one.

Basis for Southwest Claimed to Be Too Low

The carriers operating in Missouri south of the Missouri river, and in Kansas, Arkansas and Oklahoma, presented the first testimony and proposed that the basis prescribed in the Southwestern Sand Rate Investigation in 1929 be made effective in the territory involved, except in the section north of the Missouri river, where the carriers were unwilling to voluntarily accept the commission's basis. The witnesses contended that the commission had set too low a basis for the Southwest, but in view of the fact that their petition to review the order had been denied, they could not consistently propose anything else.

C. C. P. Rausch, assistant freight traffic manager of the Missouri Pacific railroad, St. Louis, and R. G. Merrick, assistant freight traffic manager of the A. T. & S. F. Ry. Co., Topeka, Kan., presented the carriers' main proposals, and with the exception of rates on sand and stone from and to the Kansas City district, urged the adoption of the same methods of applying rates as had been followed by the commission in the Southwestern case.

The lines operating north of the Missouri river in Missouri opposed the establishment of the southwestern scales in that territory and contended that a much higher basis which would be comparable with that applicable interstate between Missouri and Iowa and between Nebraska and Iowa should be made effective.

G. F. Hoffelder, assistant general freight agent of the C. B. & Q. R. R. Co., Chicago, appeared as a witness for the northern Missouri lines.

Kansas City Switching District Rate

The Kansas City situation was dealt with by H. E. Poulterer, assistant general freight agent of the Union Pacific, Omaha, who proposed that the general rate-making rules be cast aside and that rates from producing points in the switching district of Kansas City be placed on a single and joint line basis, depending on the number of lines handling the traffic within the terminal. The rates within the terminal would be those for 20 miles, regardless of the fact that many hauls are much less. On traffic from the Kansas City district the single and joint line rates would apply, depending on whether one or more lines handle the traffic and considering the switching line as a road haul carrier. This would place Kansas City producers on a joint line basis to nearly all important deliveries both within and without the terminal, and was admitted by all witnesses to be a radical departure from the usual rule that single line rates apply to and from all points within a terminal.

Many exhibits were presented by V. E. Smart, rate expert, on behalf of the Missouri Public Service Commission, showing most favorable operating conditions in that state, but he made no suggestions as to proposed rates. His testimony indicated that traffic and transportation conditions in Missouri are more favorable than in surrounding states.

One Scale Over All Lines Asked

The rate department of the Kansas Public Service Commission, through its statistician, J. W. Scott, and its rate expert, C. J. Peterson, presented very elaborate exhibits showing traffic and operating statistics, and contended that Kansas should have lower rates than Oklahoma and the other southwestern states. Mr. Scott proposed one scale of rates for application over all lines. This scale would approximate 85% of the average of the single and joint line rates fixed by the commission in the Southwestern case.

Considerable time was taken by the short line representatives, who fought for one scale for single and joint line application. Their proposed scale is about 93% of the average single and joint line rates fixed in the Southwestern case, and the basis is predicated on the finding of the commission in the Consolidated Southwestern cases that the Kansas-Missouri territory therein described should have class and commodity rates approximately 93% of the class and commodity rates fixed for the southwest generally.

The sand and gravel shippers of western Missouri and eastern Kansas were represented by E. H. Hogueland, counsel, Kansas City. C. F. Beal of Topeka, Kan., presented the testimony on behalf of these interests. This included a detailed study of all state and interstate rates prescribed in the last several years by the various state commissions and the Interstate Commerce Commission for the transportation of sand, gravel and related articles in the southwest and Western Trunk Line territories. It was shown that many of the specific commodity rates on sand and gravel in the territory involved in this proceeding are today on a basis that compares very favorably with the southwestern scales. The ton-mile and car-mile earnings under the various scales were given.

Operating and traffic statistics of the railroads of southwestern and western trunk line territories were shown for individual lines and by states, and indicate that traffic and transportation conditions in Missouri and Kansas are even more favorable than in Oklahoma, Arkansas, Louisiana and Texas, and warrant rates on sand, gravel, crushed stone, etc., at least no higher than prescribed for the southwest generally.

The Real Scale

Mr. Real proposed a scale which would start at 50c per ton for single line hauls of 10 miles, and grades up 5c per ton for each 10 miles up to 800 miles. This would produce a slightly lower level than the 17,000, part 11, scale for distances under 230 miles, but beyond that distance the Real scale would be higher than the southwestern scale. Joint line rates would be made by using the differentials prescribed by the commission in the Southwestern and Southeastern cases.

The highway programs of Missouri and Kansas were fully explained by R. F. Campbell, transportation expert of the Missouri Highway Commission, and Harold Allen of the State Highway Commission of Kansas. Mr. Campbell offered a scale which would start at 50c per ton and progress 5c per ton for each 10 miles up to 160 miles.

Freer Movement of Chats Sought

The chat shippers of the Kansas-Missouri-Oklahoma district presented their evidence through Scott Fones, who advocated a scale similar to the 17,000, part 11, basis for distances up to 100 miles, but beyond that distance favored a scale that would increase in lesser volume than set in the southwestern scale. Fones' basis at 320 miles would be $1.65, compared with the commission's rate of $1.90 under the southwestern scale. It was Mr. Jones' idea that the short-haul rate should be held up, while the longer rates should be reduced to permit a freer movement of chats, which cost only 15c or 20c a ton f.o.b. cars, compared with sand, which ranges from 60c to 75c f.o.b. cars, and crushed rock, from 85c to $1.25 per ton.

Homer J. Conley of Fort Smith, Ark., presented evidence showing the difficulties

which sand shippers in the Fort Smith district meet in competing with other shippers in southwestern Missouri and southeastern Kansas, and favored the Real scale.

The adjustment from southern Kansas into Oklahoma was presented by N. C. Dunn of Arkansas City, Kan.

Kansas City Adjustment

While the investigation really covers four states, the chief fight was directed at the Kansas City rate situation on sand and crushed stone. Through the years the Interstate Commerce Commission has in a half dozen cases placed the sand plants in the Kansas City switching district and immediately adjacent on the same interstate basis when shipping to points within the terminal as well as to points beyond. This adjustment has been entirely satisfactory to the sand shippers and was supported by W. J. Stewart, traffic manager of the Stewart Sand and Material Co.; F. W. Peck, president of the Muncie Sand Co., and J. I. Carroll of the American Sand Co., Kansas City, who stated that the present adjustment has been reasonably satisfactory.

The Kansas City stone situation precipitated more trouble than all other matters combined. T. L. Phillips and J. A. Coffey, representing the Missouri Portland Cement Co., with a stone crushing plant at Sugar Creek, Mo., within the switching limits of Kansas City, fought to overturn the decision of the Interstate Commerce Commission in the Clay County case, which has placed the various crushers in and around Kansas City on a single and joint line mileage basis. It was the contention of Messrs. Phillips and Coffey that Sugar Creek should have the benefit of the single line rates in all directions on all lines of railway. This position was contested by B. L. Glover and F. M. Lane, who represented the Consumers Material Corp. of Kansas City, it being their position that the decision of the commission in the Clay County case was a proper one and should be followed by the commission in whatever basis of rates is prescribed in this proceeding. The stone interests submitted many exhibits to support their respective contentions, and much time was devoted to the Kansas City adjustment.

The investigation was concluded at Tulsa on February 17, at which time the Tulsa interests submitted their evidence through E. N. Adams of the Tulsa Traffic Association. J. M. Chandler appeared as a witness on behalf of sand and stone interests in the Tulsa district and contended for a grouping of those plants.

Briefs will be due April 15.

I. C. C. Proposed Reports

Crushed Slate. 22433. Rates, Esmont and Dutch Gap, Va., to Oakland City, Ga., unreasonable to the extent they exceeded $5.49 per net ton. Reparation proposed.

Sand and Gravel. 22755. Rate, sand and gravel, Thorsburg pit (Wahpeton Gravel and Sand Co. spur), Minn., to Kindred, N. D., unreasonable to the extent it exceeded 5 cents per 100 lb. Reparation of $16.97 proposed.

Soapstone, Rough. 22692. Rate, Marriottsville, Md., to Saginaw, Mich., not unreasonable or unduly prejudicial. Dismissal proposed.

Outlook Good, Even If Construction Is Not Booming Now

THE OUTLOOK for construction activity in 1930 is gradually taking definite shape, according to E. J. Harding, assistant general manager of the Associated General Contractors of America. "Our statistical data now indicates boom activities in highway, public improvement and all other classes of engineering construction," he states. "The first indication of an acceleration of building activity is now at hand and relates to non-residential construction. Prospects for residential work are still indefinite with no specific indications of revival yet at hand."

The favorable outlook for engineering construction is based on several indicators, according to Mr. Harding. The increased sale of state and municipal bond issues during December, 1929, and January, 1930, presents a combined total for such bond sales that has been exceeded but once by any similar combined total.

A further indicator is seen in the recent increase in federal aid appropriations for state highways, which increase of $50,000,000 annually should result, when matched with state money, in an increase of more than $100,000,000 for such work during 1930.

Reports on contemplated work as compiled by the F. W. Dodge Corporation show that engineering construction on the boards between January 1 and February 7 is 188% greater in valuation than during the same period in 1929. These figures relate to projects being planned by engineers which have not reached the contract award stage.

Engineering construction contract awards for this year up to February 7 show an increase over last year of 60%. This is seen by the contractors' association as a tribute to the manner in which federal, state and local governmental agencies have expedited plans for construction in response to President Hoover's appeal after the stock market decline.

The first indication of an acceleration in private building operations is now visible in the reports of contemplated work in the non-residential field up to February 7. These are 30% greater in valuation than similar reports in 1929 and are seen as a very hopeful augury for the future although the volume of contract awards has not yet been increased for this class of work which is still behind last year.

While the volume of curent construction activities as measured by shipments of basic materials is seven points below February of last year the general outlook is seen as much improved with the exception of the residential construction field where both contemplated work and contract awards are about 45% off.

Clay Miners to Form Trade Association

THE clay mining companies, including importers and jobbers, are about to organize a trade association in that industry.

Several of the leading companies mining clays of different kinds for use in ceramics, paper, rubber and many other products in which clays are used, are discussing the many advantages that would accrue to both producer and consumer in this field.

Clay mining is an important industry, and it is growing in importance every year as new uses for the many different types of clay are found. There are over 100 clay mining companies in this country with a tonnage output running into large figures.

According to George C. Crossley, president of the United Clay Mines Corp., Trenton, N. J., the initial plan for the organization of a trade association is well under way, and it is felt certain that it will be completed within the next few weeks, as practically all of the clay mining companies thus far approached are strongly enthusiastic.

It is not generally known that there are over 100 different types of clays produced and used in as many different products.

Clays are used for coating paper and as a paper filler, also in the manufacture of paints, asbestos products, rubber tires, heels and soles and many other rubber products, cement, print goods, window shades, roofing, graphite crucibles, glass and glass melting pots, wall plaster and gypsum products.

It is felt that there are many ways both producer and consumer can work together to their mutual benefit as a result of proper organization. It is planned to give careful study to the standardization of different classes of clay, to carry on research in an effort to improve the quality and to find new markets for the clay.

There should be many opportunities where the miner of a clay can work more closely with the clay user to solve the difficult problems now encountered.

There is no doubt that such matters as freight rate study, loading and shipping arrangements and many other troublesome factors can be helped by co-operative effort.

W. J. Parker, 7 East 44th St., New York City, who was so successful in organizing the Feldspar Grinders' Institute, is aiding the forming of the clay association.

Missouri Cement Men Meet at St. Louis

Three Cement Mills in Eastern Part of State Hold Annual Safety Conference

OPERATING departments of the Alpha Portland Cement Co. mill at Jefferson Barracks, Mo.; Missouri Portland Cement Co. mills at Prospect Hill (St. Louis), and Universal Atlas Cement Co. mills at Hannibal, Mo., assembled at Hotel Coronado, St. Louis, on February 25th for their annual safety meeting.

Although these mills were formerly included in the area attending the annual safety meetings at La Salle, Ill., it was considered advisable to arrange for a St. Louis meeting in order to make the advantages available to a larger number of local operating men than could make the trip to La Salle. This arrangement was fully justified as the meeting was one of the best held so far in the industry. Hiram Norcross, vice-president and general manager of the Missouri company, acted as general chairman, being assisted in handling local arrangements by F. R. Loveridge, superintendent of the local plant of the Alpha company and B. G. Coyle, treasurer of the Missouri company.

Joseph T. Davis, president of the St. Louis Safety Council, made one of the most eloquent pleas for safe performance yet made to cement mill audiences. He praised the progress of the industry during recent years and months, saying that though the record was not as good as it could or should be, he predicted further improvement during the coming months. The addresses of Herman Spoehrer and Dr. George F. Chopin both proved very beneficial, but unfortunately were given extemporaneously and therefore cannot be reproduced.

The program was as follows:

Program

MORNING SESSION

Common Ground of Safety, Joseph T. Davis, president, St. Louis Safety Council.
Progress in Accident Prevention Work, Herman Spoehrer, secretary, Union Electric Light and Power Co.
Plant Emergency Cases, Dr. George F. Chopin, surgeon, Missouri Portland Cement Co.

AFTERNOON SESSION

Discussion of Specific Mill Safety Problems, led by George Ross.
Prevention of Accidents in Quarry and Crushing Departments, F. P. Griswold, technical representative, E. I. DuPont de Nemours and Co.
Safe Practice in Shop and Repair Work, R. A. Hoffman, plant manager, Universal Atlas Cement Co., Hannibal, Mo.
How About Your Mill Housekeeping?, Edward Hemmer, safety engineer, Alpha Portland Cement Co., Jefferson Barracks, Mo.
Storage Packing and Shipping Hazards, Edward Jarman, packing house foreman, Missouri Portland Cement Co., St. Louis, Mo.
General Discussion.
First aid discussion and demonstration by W. D. Ryan, safety commissioner, U. S. Bureau of Mines, assisted by first aid team of Missouri Portland Cement Co., St. Louis plant, and A. U. Miller, assistant mining engineer, U. S. Bureau of Mines.

Hiram Norcross

At the dinner, Gabriel S. Brown, president of the Alpha Portland Cement Co. and one of the first chairmen of the committee on accident prevention of the Portland Cement Association, presided as toastmaster. Mr. Brown sketched the early struggles which he and others in the industry experienced in arriving at a consistent attitude toward accidents and of his ultimate conviction that they must be eliminated.

Mr. Brown recalled the struggles of the ten Alpha cement mills from a record of many accidents to the achievement of 1929, when one of his mills completed three calendar years without accident, another two calendar years, three had but one accident each, and in the entire group the number of recordable accidents was only eighteen.

Safety in Use of Explosives

F. P. Griswold read a paper on the above subject, prepared by R. H. Summer, technical representative of the Du Pont organization, who was unable to be present. This paper, because of the widespread interest in the subject is given below in part:

"It is essential that everyone handling explosives, or in any way directing their storage or use, observe every precaution. Discipline in enforcing the obeying of these rules cannot be overdone. For many years records of accidents have been kept and practically all of the listed precautions are based on investigations indicating their need. It is a significant fact that in recent years nearly every accident investigation reveals the fact that one or more of the precaution rules have been violated. These safety rules are printed in various forms. They are contained in leaflet form in every case of dynamite. Posters carrying these precautions are distributed by manufacturers of explosives and should be placed where all those handling explosives can read and see them. On this poster is printed a list of 40 "Don'ts." That is, 49 things not to do with explosives, and applies to the use of explosives in general. Most of the blasting for cement rock is in open quarry work and additional precautionary measures are needed to apply.

Misfires

"Misfires have an important relation to safety. The methods of detonating explosives, whether cap and fuse, electric blasting caps, or cordeau, should be carefully studied and every precaution taken to eliminate all missed shots. This is true in blockholing as well as in primary shooting. When misfires do occur, they should be handled in a careful manner by an experienced workman familiar with the hazard.

"I once had occasion to recover some electric blasting caps from missed holes. These holes were tamped and the cap said by the foreman in charge to be 12 ft. down the holes. He brought a jackhammer to drill out the tamping. I protested this method. The foreman said he had been doing that for thirty years and in that many years of quarry work had only killed three men. A minimum value of life of only one in ten years is still very costly. We blew the tamping out with an air pipe and found the caps to be from 8 to 10 ft. down the hole. Had a jackhammer been used based on 12 ft. to the cap, a serious accident might have occurred. This illustrates the need of knowledge of conditions in handling a misfire.

"In loading well drill holes it is common practice to place the amount of explosives required per hole near the collar of the hole. This is a dangerous practice and has resulted in unnecessary loss of life. The boxes should be opened several feet from the hole and all loose explosives kept out of range should explosion occur in the hole, and away from the cordeau at the top of the hole. One accident which I investigated a few years ago was caused by the first few cartridges

George Ross

dropped in the hole plugging before reaching the bottom. The blaster used a babbitt block to force the explosives down the hole. During this act the few cartridges in the hole exploded, transmitting the explosion to four cases of dynamite on top of the hole. Eight men were killed as a result. Three breaches of safety were committed here:

1. The explosives on top were too near the hole.
2. There was a needless concentration of workmen around the hole.
3. And obviously the direct cause was the use of babbitt tamping block.

It is well to always distribute both explosives and men when a shot is being loaded.

Sprung Holes

"Sprung holes have been the cause of many accidents. Care should always be used to see that the rock in a sprung hole is sufficiently cooled before a second springing or loading of the hole. Several hours in dry holes should elapse, or better still, spring one day and load the next. The choice of dynamite is very important in sprung holes and should be considered in any kind of blasting. Springing bore holes opens cracks and crevices and a straight dynamite is likely to get pinched between rocks and start detonation. Gelatin dynamite is less sensitive and because of its cohesive nature is safer to use under almost any conditions.

"In any kind of blasting, sparks from steam shovel and locomotive should be guarded against. Connecting holes in a large blast should never be done until tracks and shovel are in the clear and all workmen away from in front of the proposed blast. Premature blasts have occurred and because of connections all being made much damage to property and loss of life suffered. Connections should not be made during a nearby lightning storm.

"Detonators should always be kept under lock and key, and care should be taken never to allow loose caps to lie around the quarry or to be carried home in the pockets of workmen.

"Many accidents have happened in thawing frozen dynamite. One of the most important developments during the past few years by explosive chemists has been the development of low freezing nitroglycerin so that nitroglycerin dynamites are practically non-freezing at any temperature experienced in this country.

Careless Employes Dangerous to Welfare

"Regarding human element, it is paramount that the man react as definitely as does the explosive. No explosive is safe in the hands of a careless man, or one who is ignorant of its characteristics. Carelessness, ignorance, and false bravery are the tri-part archenemies of the safe use of explosives. A man with any one of these three characteristics should not be permitted to handle explosives.

"A good careful powder man can be developed by the right kind of training. Nevertheless, a man should not be trusted with using explosives until he is fully familiar with their characteristics. The man possessed of false bravery is perhaps the worst type of man on a powder crew, for he breaks down the morale of the crew and instills a bravado spirit among his fellow men."

Safe Practice in Shop and Repair Work

R. E. Hoffman's paper on this subject was based on a safe practices pamphlet on this subject prepared for the cement section of the National Safety Council by J. H. Kempster, general superintendent of the Buffington, Ind., plant of the Universal Atlas Cement Co. Mr. Hoffman said in part:

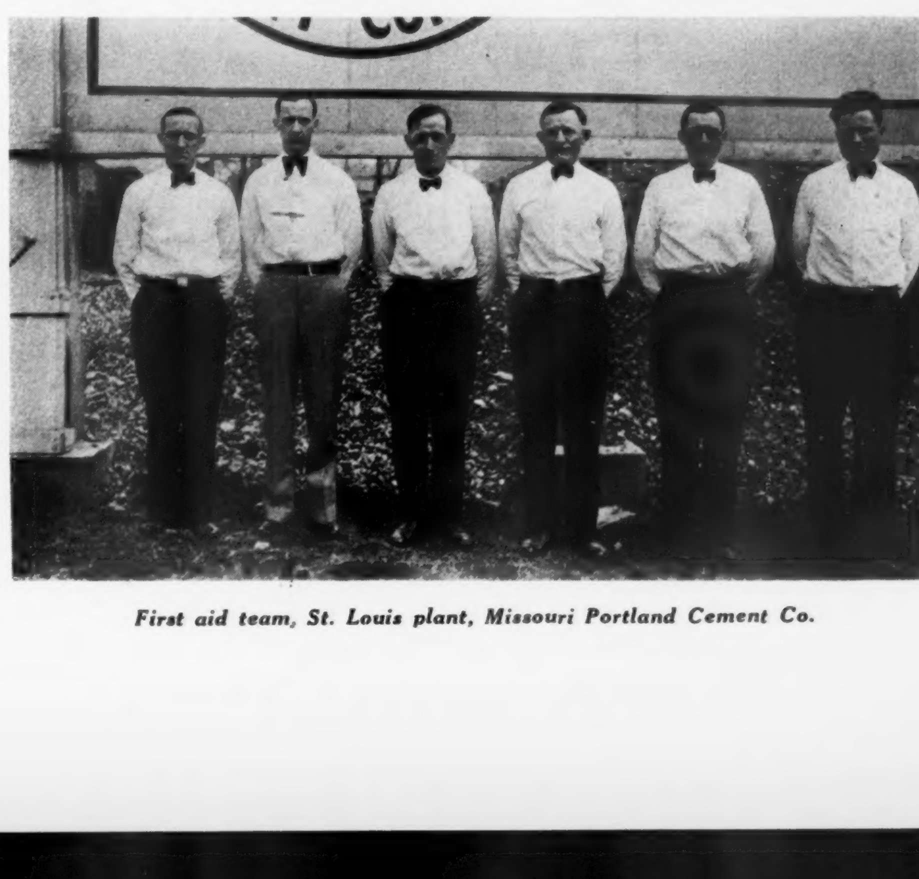
"The work done and the tools used in a cement mill equipment repair shop are quite different than in one manufacturing a single line of products. The operations vary from the fabrication of heavy plate steel for kiln or dryer replacements, to the delicate repairing of electrical instruments; from heat treating of grinding mill machinery to rebuilding sensitive laboratory equipment; from the reclothing of dust filters to the accurate machining of air compressor pistons, cylinders and valves. In the production shop the operations are not so varied and definite machine tools and fittings are employed.

"In a production shop a certain safeguard may be employed for a considerable period because the operation performed is not changed. In the cement mill shop the various operations frequently require the removal of one safeguard and the installation of another. Also, the repairs made are in some cases such that safe practices on the part of the worker or his shop mate are the only practical type of protection.

"If successful results in safety are to be secured, everyone in the plant, from the highest executive to the most menial laborer must take an active interest in all safety matters. There must be ever present reminders to the men so that they do not allow themselves to become lax.

"The storeroom is one place where the management may show its interest in safety. Well lighted bays and orderly arrangement of stock are evidences of good housekeeping. Such practices will prevent many accidents and stimulate interest in safety."

The discourse and demonstration by W. D. Ryan, safety commissioner of the U. S. Bureau of Mines, assisted by the team of the Missouri Portland Cement Co., provided an hour of practical information on emergency



First aid team, St. Louis plant, Missouri Portland Cement Co.

training. Three typical problems were performed by the team.

Registration

REGIONAL SAFETY MEETING,
ST. LOUIS, MO.

Alpha Portland Cement Co., St. Louis, Mo.
Harry Bochnicek, clerk.
A. R. Gardner, plant electrician.
W. W. Gardner, quarry foreman.
John Gasper, Jr., laboratory.
E. G. Hammer, safety supervisor.
William Huegel, packing house foreman.
Frank John, maintenance.
E. R. Kilpatrick, master mechanic.
F. R. Loveridge, superintendent.
C. D. Merritt, plant engineer.
H. D. Pickering, office.
Arthur C. Robitsch, kiln room foreman.
J. H. Schaeffer, chief clerk.
Henry Scherff, foreman.
William Wagner, mill foreman.
Alpha Portland Cement Co., Easton, Penn.
Louis Anderson, chemical engineer.
G. S. Brown, president.
Alpha Portland Cement Co., La Salle, Ill.
Henry McClarnan, general superintendent.
Missouri Portland Cement Co., St. Louis, Mo.
H. E. Armstrong, repairman.
Joseph Barch, kiln foreman.
George Block, vice-president.
M. Burkamp, packing room foreman.
G. F. Chopin, physician.
D. B. Coleman, office.
B. G. Coyle, treasurer.
Loren L. Crain, steam shovel craneman.
Henry Daigger, storeroom clerk.
A. F. Diedrich, chief electrician.
Theo. Diedrich, carpenter sub-foreman.
George M. Hasen, foreman.
E. C. Jarman, foreman packing department.
E. Kamischke, carpenter department.
Fred Knichel, mill foreman.
Delbert Miller, crusher foreman.
C. C. Montgomery, machine shop foreman.
Howard Mull, electrician foreman.
Ernst H. Muth, mill foreman.
Chas. Muth, mill foreman.
James Phillips, quarry foreman.
H. Rankin, stripping (quarry).
E. Rosenkoetter, steam shovel engineer.
George Ross, general superintendent.
Malcolm Rowe, carpenter foreman.
Geoff A. Saeger, chemical engineer.
W. H. Sanders, steam engineer.
W. J. Scahill, timekeeper.
John Schopin, powder man.
O. F. Schulze, superintendent.
T. A. Sorrell, mill.
E. M. Stevens, chief engineer.
Lee B. Torbitt, kiln room sub-foreman.
Elmer Wagner, foreman.
Universal Atlas Cement Co., Hannibal, Mo.
J. W. Erhard, safety supervisor.
Ray E. Hoffman, plant manager.
J. M. Stolle, superintendent, bag and packing.
Miscellaneous
A. J. R. Curtis, Portland Cement Association.
Joseph T. Davis, president, St. Louis Safety Council, St. Louis.
F. P. Griswold, technical representative, E. I. du Pont de Nemours and Co.
A. U. Miller, associate mining engineer, U. S. Bureau of Mines, Vincennes, Ind.
W. D. Ryan, safety commissioner, U. S. Bureau of Mines, Kansas City, Mo.
Charles B. Spicer, special representative, Hercules Powder Co., St. Louis.
Hermann Spoehrer, secretary, Union Electric Light and Power Co., St. Louis.
John K. Walsh, mining engineer and salesman, Hercules Powder Co., St. Louis.

Safety Is Theme at La Salle

Illinois Mills Plan to Make Appreciable Reduction in Accidents During 1930

ILLINOIS and northern Indiana cement mills held a most enthusiastic annual safety meeting at La Salle, Ill., on Tuesday, March 4. Mills of the Alpha Portland Cement Co. at La Salle, Lehigh Portland Cement Co. at Oglesby, Medusa Portland Cement Co. at Dixon, and the three mills of the Universal Atlas Cement Co. at Buffington, Ind., were all well represented. Henry McClarnan, general superintendent of the western mills of the Alpha company, acted as chairman.

The outstanding reduction of accidents of all classes in the Illinois mills during the past year was reflected in the enthusiastic interest and unconcealed general belief that these mills are due to win several trophies during 1930. Four of the six mills represented have had no reportable accidents so far this year; one mill has suffered one accident, and the other, three accidents since January 1. During the corresponding period last year the same mills suffered a greater total of accidents.

C. B. Fowler, chief chemist of the Medusa plant at Dixon, which has been overcoming a difficult accident situation, explained that the mill was now on the road to a clear record, had not had an accident this year, and was making a desperate and so far successful effort to keep up and intensify interest. The Medusa plant has had two great mass meetings so far this year and has succeeded in attracting the attention of the chief officials of the company to its progress and strenuous efforts to avoid mishap.

The program of the meeting was as follows:

MORNING SESSION

Safe Practices in the Quarry—A reading by the secretary of a paper on the subject prepared by Felix Guenther, Jr., general superintendent, Pennsylvania-Dixie Cement Corp.

Avoiding Accident Hazards in Shop Practice—Walter Heath, assistant general superintendent, Universal Atlas Cement Co., Buffington, Ind.

How Is Your Plant Housekeeping?—John Allwood, safety inspector, Lehigh Portland Cement Co., Oglesby, Ill.

LUNCHEON

Address by Victor T. Noonan, consulting safety engineer, Rockford, Ill.

AFTERNOON SESSION

The Foreman's Part in the Safety Campaign—Charles Wagner, Western Clock Co., Peru, Ill.

Beware the Electrical Hazard—W. C. Powell, safety engineer, Medusa Portland Cement Co.

What About Coal Dust?—James Bassett, plant engineer, Lehigh Portland Cement Co.

Safe Storage, Packing and Shipping—C. A. Buchman, shipping foreman, Medusa Portland Cement Co., Dixon.

Observations About First Aid Training—W. D. Ryan, safety commissioner, U. S. Bureau of Mines.

What the Figures Show About Our Safety Progress—A. J. R. Curtis.

Henry McLarnan

The Foreman's Part

In opening the meeting Mr. McClarnan said in part:

"The success of any accident prevention campaign or work will depend largely upon the relation between the foreman and employes over whom he is in authority. The foreman must be considerate of the men and women working under him. He should take a genuine and sympathetic interest in their welfare, but he should never lose his sense of dignity and leadership nor be cordial to the point beyond familiarity.

"A foreman should always be fair and not let his likes and dislikes influence him. He should obey all rules and regulations, no matter how difficult this may be. A foreman who issues a safety order and then violates it himself can hardly expect those under him to believe the rule or order is important.

"The cost of industrial accidents is tremendous and is borne by the company, the worker and the public. The company pays in many ways, such as compensation, loss of time, loss of production, cost of breaking in new help, doctor bills and hospital bills. The worker pays in loss of wages, receiving only part of his pay as compensation, and if the accident results in a permanent disability his earning power is impaired for life and he may have to seek other means of livelihood. The public pays its share of accident costs in the purchase of commodities, these costs having been added to the selling price.

"In a study of causes of accidents will be found the key to their reduction. The accident causes may be divided into three classes: (1) Mechanical hazards, (2) physical condition of worker, (3) mental condition of worker.

"By mechanical hazards I refer to operating machinery, the use of unsafe equipment and tools, rickety stairways, unguarded elevators, danger of flying objects, slippery floors, worn parts, and guardless shafts and belts. The physical condition of the worker is influenced by ventilation, temperature, light, and the sanitation of the shop. The mental condition of the worker is meant by his attitude toward his job. Carelessness, recklessness, disobedience, ignorance and indifference are all the results of attitude of mind.

Making the Department Safe

"What can the foreman do to make his department safe? He must set a good example. He must come out flatfooted for safety and practice what he preaches. He must give safety as sincere attention as he does production. He must give careful instructions regarding the operations in his department, not only telling the man about his job, but going through with it step by step. He should discourage horseplay.

"He should everlastingly keep after the men to pile materials neatly, warn them against the danger of leaving things lying around, see that they use their goggles, look out for rickety ladders and watch a hundred and one other safety pointers. It takes patience because the men have to be told over and over again.

"He should thoroughly investigate every accident in his department, go into it and ascertain whether it was caused by unsafe equipment, unguarded machinery, carelessness, negligence on the part of the employe, or whether the foreman was to blame in not providing proper supervision or instructions. He should face the issue clearly. He must have backbone enough to see that the rules regarding safety are not violated and go after the boys that do violate them.

"The most important single educating influence that can be exerted among the workers is the influence of the foreman who knows his stuff and is sold on the idea and sets an example to his help. Management must do its share; provide the necessary safeguards, mechanical and otherwise, before it can expect the workers to become heartily in accord with its safety teachings.

"The foreman must get behind every safety campaign sponsored by his company, because he is the medium whereby the management's policies are carried out."

What About Coal Dust?

James Bassett, in his discussion of coal dust hazards, gave credit for many of his ideas to the bulletin on dust hazards by the U. S. Bureau of Mines. Mr. Bassett's paper was as follows:

"Explosive accidents are due largely to powdered coal being thrown on open lights, to the lighting of matches in a dusty atmosphere, to the short-circuiting of electric wires by moist coal dust, and to an open salamander stove in a building covered with coal dust. One of these accidents, which burned several men very severely, occurred out of doors, showing that a dust cloud can produce very serious results, even when not confined in a building or other structure.

Most Accidents Due to Ignorance

"Many accidents charged to pulverized coal are due largely to ignorance of its characteristics. When plants are properly designed and operated, such fuel is probably no more likely to flash or explode than is natural gas. The odor of escaping gas is a danger signal and steps are taken to stop the leak immediately. On the contrary, if a coal transport line or conveyor is leaking pulverized coal, little attention is given to it. Yet a leaking line of coal dust has the same potential danger as a leaking gas line.

"The man who runs the drier has a responsibility similar to that of the man in charge of a battery of boilers. If he performs his duties improperly and allows the drier to overheat, an explosion is almost sure to follow. Driers should be equipped with bypasses for use when they are not in operation, so that the gases of combustion cannot pass through the drum.

"Next to the drier one of the most prolific sources of trouble is the large main used for the circulation of a mixture of coal dust and air in certain systems of distribution. Irregularities in air pressure due to variations in flow may cause secondary air to enter the distribution main, carrying with it hot particles from the furnace.

Limited and Open Storage Preferable

"Because bituminous coal tends to absorb oxygen rapidly and thereby reach a stage of combustion, the storage of dried or pulverized coal should be limited to as small an amount as possible. The critical point at which oxidation of coal begins to increase rapidly seems to be about 150 deg. F.; from that point the temperature increases rapidly to the ignition point.

"Bins should of course be tightly covered and all manholes and other openings should be airtight. It is well to vent bins to the outside for the release of pressure. This vent should have a valve that can be closed whenever the bin is out of operation and yet contain an appreciable amount of fuel. In this way the liability to spontaneous combustion is decreased. All joints should be welded, and in actual practice it has been found that if the corners are well rounded the coal is less likely to cake and adhere to the sides. It seems wise to remove pulverized coal storage bins from immediately over furnaces, and preferably to construct them outside the main building.

"A pulverizing building should be so situated that there is no chance of sparks entering through windows, ventilators or doors. If this is impracticable, all openings should be screened.

"About the only method of controlling a fire in a pulverized coal bin is to cut off the feed to the furnace and empty the bin as quickly as possible, with care to avoid raising a dust cloud that might be ignited by contact with the burning coal. Some manufacturers equip bins with airtight valves which may be closed in case of fire, sealing the bins and preventing the admission of air.

"If a dust explosion occurs under conditions that favor the building up of pressure, very high pressure may be obtained. In tests at the Bureau's experimental mine, pressures as high as 119 lb. per sq. in. were developed in 750 ft. within 2.2 seconds. The advantage of light building construction is illustrated in a number of cases, where explosions have simply blown out wall panels or windows and done little other damage. Windows near the ground should not be glazed with wire glass, because in an emergency they may be the only means of escape for the men in the plant. Manufacturers of explosives often provide floor windows with safety catches so hung that in an emergency they may be swung open, permitting workmen to escape when doors are inaccessible.

"The remedy for danger is good housekeeping. The plant must be kept clean and free from accumulations of coal dust on beams, window sills and other ledges. The use of vacuum cleaning machinery is to be commended. Compressed air for blowing dust from ledges is distinctly dangerous, inasmuch as it promotes the formation of clouds. Whitewashing the plant throughout is of considerable value in increasing the visibility of accumulations of coal dust."

Registration

REGIONAL SAFETY MEETING,
LA SALLE, ILL.

Alpha Portland Cement Co., La Salle, Ill.

Joseph F. Adamczyk, construction foreman.
A. Barone, packer.
Anton Bruski.
Art Davison, chauffeur.
Anton Derzig, carpenter.
John Derzig, repairman.
W. Donahue, blacksmith.
Barney Dzierzynski.
Fer. Faerber, miller.
John Ficek, foreman.
Edw. Foley, storeroom.
L. Ganze, physical tester.
A. Gardin, packer.
John Gillespie, foreman.
R. K. Gimson, chemist.
Alb. Godawa, coolers.
Walter Goodwin, Jr., electrician.
C. Grauer, tunnelman.
Anton Grubich.
John S. Gryzbowski, physical tester.
Frank Hofka, mill.
T. H. Huling, plant engineer.
John Jashack, mill laborer.
William Kable, shovel engineer.
Joseph Kaszynski, foreman.
L. Klein, foreman.
W. Kmieciak, mill laborer.
John Kopacz, burner.
Martin Kotecki, mill laborer.
Joseph Lawniczak, storekeeper.
Joe Lenski, repairman.
A. Lewandowski, mill laborer.
Joseph Lacosta, locomotive engineer.
G. Lundberg, superintendent.

H. McClarnan, general superintendent.
Frank Marine, repairman.
John Martini, foreman.
Arthur Menning.
Walter Menning, machinist.
Lester Morrow, timekeeper.
P. Murphy, foreman.
Harry Noel, shipping clerk.
Charles Nagai, clinker department.
Stanley Nagai, machine shop.
Aug. R. Pabian, machine shop.
Frank Pietrucka, repairman.
Anton Piletic, mill laborer.
Guy Piraino, bag room.
John L. Reinhard, chief clerk.
H. Roesenke, head burner.
Frank Rowinkov, machine shop.
William Schlosser, repairman.
William Schulze, machine shop.
Joseph Struckel, packer.
William Sueltz, kiln.
V. Swishoski, repairman.
John Szafranski, coolers.
J. W. Temm, electrical engineer.
N. J. Tesch, miller.
V. Woisnech, kiln.
L. Wojciechowski, machinist.
R. Wojciechowski, machinist.
Frank Urbanski, blacksmith.
Walter Yanka, electrician.

Lehigh Portland Cement Co., Oglesby, Ill.
John Allwood, safety engineer.
Joe Avilla, machinist.
Lee Berryman, assistant foreman.
A. L. Carbine, foreman.
John Hibernick, assistant foreman.
Jess Hurst, clerk.
A. Jesinofski, repairs.
S. A. Kidd, chief clerk.
Emil Koehl, quarry engineer.
James Marzetta, rigger.
John L. Rock, M.D., surgeon.
Emil Spriet, repairman.
Bert Taylor, electrician.
John Topolski, laboratory.
John Young, superintendent.

Medusa Portland Cement Co., Cleveland, Ohio.
W. M. Powell, safety director.

Medusa Portland Cement Co., Dixon, Ill.
Paul H. Brookner, garage foreman.
C. A. Buchner, packing department.
E. W. Carlson, engineer.
H. Espy, assistant chemist.
C. B. Fowler, chief chemist.
H. W. Hoon, chief clerk.
F. LaMaster, quarry foreman.
Philip Mooney, plant engineer.
J. P. Petersen, storekeeper.
Frank S. Wadzinski, yardmaster.

Universal Atlas Cement Co., Buffington, Ind.
John Buxton, boiler house foreman.
N. L. Brown, general mechanical foreman.
C. P. Conway, electrical foreman.
Sidney C. Englin, operating foreman.
Walter H. Heath, assistant general superintendent.
John P. Kent, civil engineer.
C. Peppriatt, office.
Charles M. Pratt, foreman.
A. L. Putnam.
F. H. Sass, superintendent S. and L.
C. R. Van Aken, superintendent electrical department.

Miscellaneous
F. Arnold, reporter, "Post Tribune," La Salle.
A. J. R. Curtis, Portland Cement Association.
F. L. Hackman, superintendent industrial relations, Western Clock Co., La Salle.
W. F. Gainty, salesman, Hercules Powder Co., Chicago.
H. Larson, safety engineer, Matthiessen and Hegeler Zinc, La Salle.
C. Miller, reporter, Peru "News Herald." Peru, Ill.
Victor T. Noonan, consulting safety engineer, Rockford, Ill.
W. D. Ryan, safety commissioner, U. S. Bureau of Mines, Kansas City.
A., C. Skelton, superintendent state, La Salle.
Charles A. Wagner, foreman, Western Clock Co., La Salle.

Universal-Atlas New Appointments

UNIVERSAL Atlas Cement Co., Chicago, Ill., announces the following changes in the personnel of its sales department: O. H. D. Rohwer, heretofore division sales manager of the company, is appointed an assistant general sales manager. Mr. Rohwer was connected with the former Universal Portland Cement Co. for twenty years, starting in the St. Louis office in 1907. A. C. Cronkrite, who has been assistant general sales manager, continues in that position.

N. A. Kelly, previously sales manager at New York for Universal Portland Cement Co. is appointed to the same position with the enlarged organization.

A. O. Stark, appointed assistant sales manager at New York, was connected in a sales capacity with the former Atlas company for more than twenty years.

William A. McIntyre of the former Atlas company has been appointed to direct the sales forces working out of Philadelphia.

Pennsylvania-Dixie to Improve Iowa Plant

IMPROVEMENTS to the Valley Junction (Iowa) plant of the Pennsylvania-Dixie Cement Corp., at a cost of approximately $175,000, are announced. Contract has been awarded to the Burrell Engineering and Construction Co. of Chicago for the erection of a four-story building, 40 x 82 ft., to be utilized for packing and other shipment detail, and a one-story building, 80 x 120 ft., to be used for storage. The plant is scheduled to be in full production by April 1.

Myram H. Hammond

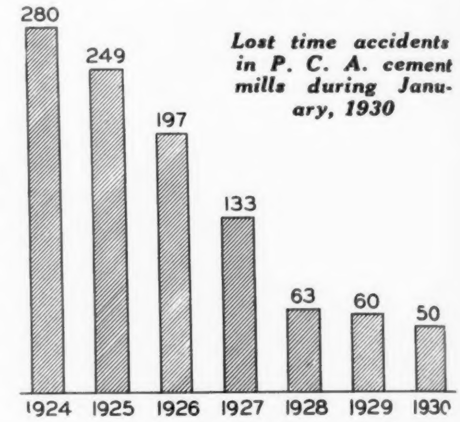
MYRAM H. Hammond, vice-president, Great Lakes Portland Cement Corp., Buffalo, N. Y., died suddenly on Wednesday evening, March 5. Mr. Hammond was well known among operating men of the industry, and will be keenly missed. He was associated with the construction of cement plants in Cuba and Argentina; later he worked at Iola, Kan., and Dallas, Texas. More recently he was associated with the plant at Greencastle, Ind., and went to Buffalo when the Great Lakes company built its new plant there.

Myram H. Hammond

January Cement Mill Accidents

ACCIDENTS were less frequent in the cement mills during January, 1930, than during January, 1929, which month showed the lowest accident total of any January since the records have been kept. January accidents have shown a steady decline during the last six years. During January, 1930, there were 48 lost time and 2 fatal accidents, while in January, 1929, there were 56 lost time and 4 fatal accidents.

Both of the fatal accidents reported for January occurred in the power department.



In one case a waste heat boiler header blew out, striking a boiler repairman on the head, causing a fracture of the skull. He also suffered scalds. In the second fatal accident of the month an employe who was engaged in running coal from the bunkers to the boiler room storage tanks evidently caught his clothing on elevator line shaft.

One hundred twenty-three of approximately 150 cement plants reporting accidents to the Portland Cement Association completed January, 1930, without lost time injury to an employe as compared with 121 plants which made a similar record in 1929, and 105 plants in 1928.

Talc and Soapstone in 1928

SALES of talc by producers in the United States during 1928 amounted to 202,976 short tons, valued at $2,537,994; they comprised 6360 tons of crude talc, valued at $48,031; 936 tons of sawed and manufactured talc, valued at $70,394, and 195,680 tons of ground talc, valued at $2,419,569. Total sales in 1928 increased 5.5% in quantity and 13.6% in value over those in 1927. Crude talc increased 11.5% in quantity and 89.4% in value; sawed and manufactured talc decreased 37.3% in quantity and 37% in value, and ground talc increased 5.7% in quantity and 15.3% in value.

Prices in 1928 for crude talc ranged from $2 to $30 per ton, manufactured talc (crayons) from $55 to $275 per ton and ground talc from $5 to $20 per ton. These above data and other information are contained in the Bureau of Mines publication, "Talc and Soapstone in 1928."

New Feldspar Grinding Plant

PLANS for a new feldspar grinding mill at Buckingham, Que., have been virtually completed, according to a recent announcement. The mill will use spar from M. J. O'Brien, Ltd., mines in the district, which company is interested in the proposition. At present crude spar is shipped from the district to the United States.

Flint and quartz, mined in the Buckingham and Gatineau areas, will be ground also at the new mill.

P. C. A. Appoints W. G. Hudson New Orleans District Engineer

WILLIAM G. HUDSON has been appointed district engineer in charge of the Portland Cement Association work in the states of Mississippi and Louisiana, according to a recent announcement. Mr. Hudson has been a member of the field staff of the association's New Orleans office since 1923, resident at Shreveport. A native of Tennessee and educated in that state, he is well known in the building industries of Louisiana and Mississippi. His offices will be in the Hibernia Bank Building, New Orleans.

Interesting Facts About Sand and Gravel

STATISTICS are dry reading; and those for sand and gravel production in the United States for 1928, recently released by the U. S. Bureau of Mines are no exception. However, there are some facts in connection with this report that are interesting, which probably 99% of those who receive it will overlook.

Washed and screened sand and gravel constitutes 77% of the total production. The average value of the washed and screened product was 61c. per ton, f. o. b. plant, compared with an average value of all sand and gravel, including, of course, the washed and screened, of 57c. Figuring these statistics backwards—which the report does not do for us—gives the average value of the bank run stuff at 43⅔c. per ton. In other words washing and screening added 17c. per ton to the value of the commodity.

The average value per ton, f. o. b. plant, in 1928, for various kinds of sand and gravel were as follows:

Glass sand	$1.49
Molding sand	1.06
Building sand	0.53
Paving sand	0.49
Grinding and polishing sand	1.30
Fire or furnace sand	1.18
Engine sand	0.64
Filter sand	1.99
Railroad ballast gravel	0.30
Gravel (exclusive of railway ballast)	0.65

The best prices are obtained in the Eastern States, the lowest in the Western States. Better prices were obtained in the South than in the Central States.

Sand and gravel have been imported into the United States from 19 different countries during the last three years. Most of it, of course, comes from Canada, but 1 ton, valued at $4, was imported from Bermuda in 1927 (we wonder if there was any bottled coarse aggregate with it!) and 1 ton valued at $3 from Australia the same year. Some mighty valuable sand came from the Dominican Republic in 1928—2 tons valued at $50. One ton of Jewish sand from Palestine in 1928 was valued at $10. But the United States exported practically as much sand and gravel as was imported—and its value was nearly twice as much.

New Refractory Brick Plant at Mexico, Mo.

PLANS for the construction and operation of refractory brick plants at Mexico, Mo., by the newly organized Mexico Refractories Co. are announced by J. B. Arthur, president of the company. The plants will be located on the C. P. Arnold farm, a mile northeast of Mexico. It is expected the plants will be in partial operation by June or July, as work will be started on the switch track from the C. and A. tracks near Francis shortly. Initial capacity will be from 6 to 8 carloads of brick per day.

The company is to have an authorized capital of $1,600,000 common stock and $150,000 preferred. Associated with Mr. Arthur in the new company are J. H. Kruson, vice-president, and J. W. Buffington, secretary-treasurer.—*Mexico* (Mo.) *Ledger.*

Memphis Company Enlarging Gravel Plant

THE Memphis Stone and Gravel Co. has started work on a modern washing plant at Camden, Tenn. Capacity will be increased to about 75 cars per day from its present output of 40 cars.—*Nashville* (Tenn.) *Tennessean.*

Midwest Conference of National Safety Council

THE eighth annual Midwest Safety Conference of the National Safety Council will be held on Tuesday, March 18 at the Palmer House in Chicago. While no sessions of the rock products industries are scheduled, a number of interesting adresses, such as "Accident Prevention in Industry" by R. B. Morley, secretary-treasurer, Industrial Accident Association of Ontario, Can., and "Public Safety" by Dr. Herman N. Bundesen, coroner of Cook County, Ill., are worthy of note by those interested in the general subject of safety.

An evening dinner session, following the general sessions, is part of the program.

J. Harry Barbazette

J. HARRY BARBAZETTE, manager of operations in charge of the western division mills of the Alpha Portland Cement Co., died at his home in Chicago on March 4. One of the best known and liked officials in the cement industry, his technical knowledge of cement production led to his recognition as one of the leading engineers in that field. He practically grew up with the cement industry, starting his career in it 26 years ago.

J. Harry Barbazette

Mr. Barbazette was born in Beardstown, Ill., 47 years ago, and received his schooling at Terre Haute, Ind. He was graduated from the Rose Polytechnic Institute of that city as a mechanical engineer in 1904. Immediately following his graduation, he became associated with the Louisville Cement Co. at Speed, Ind., leaving this connection a year later to take a position with another cement concern at Iola, Kan.

In January, 1909, he joined the Universal Portland Cement Co. as superintendent of construction of plant No. 6 at Buffington, Ind. Four years later he was sent to Duluth, Minn., as superintendent of the Universal's plant at that point. Following this connection, he was employed by the Mid-West Credit and Statistical Bureau for several years, leaving to take the post of assistant sales manager of the Lehigh Portland Cement Co., Chicago, which he held until March, 1920. On joining the Alpha Portland Cement Co., he was soon promoted to the position he held until his death.

Mr. Barbazette is survived by his widow, Marie, four sons, his mother and a brother.

A West Coast Cement Mill Promoter Figures His Expected (?) Profits

NATIONAL CITY, Calif. (population 3116, census of 1920) is quite excited over the possibility of a large rock products industry locating there. At any rate a group of that town's leading citizens gathered at the parish house to listen to the proposed plans of the recently organized Columbia Cement Co. and the recital made a front page story for the *National City News*, with an eight-column head, etc. The principal speaker was J. Fred Larson, assistant to the president, Columbia Cement Co., whose remarks pertaining to the profits of the undertaking and the benefits to be derived by the town, are given herewith for what they are worth. They offer a certain amount of interesting information to established rock products producers.

After complimenting the town on its go-getting citizens (notably the Chamber of Commerce), Mr. Larson gave an outline of figures from which the estimated calculations for costs, earnings and profits were made. He said in part:

"The eleven square miles of lime rock in the Coyote mountains near the Imperial county line, showing 97% pure calcium carbonate, is now the property of the Columbia Cement Co. and contains enough material to keep a million barrel cement mill going for over 2000 years, or sufficient to supply the entire cement industry of the United States for 12 years.

"We shall be happy to confine our operations to our own trade territory, or such markets as can be reached profitably without competition.

"While we talk of a cement mill, our deposits and facilities will also produce white cement, glass sand, burned and hydrated lime and pure lime rock.

"The Pacific coast market today absorbs around 200,000 bbl. of white cement annually, at present all coming from the Lehigh Valley, Penn., retailing at $10 per barrel. We are satisfied however, that this market could be doubled by reducing the price to $6 a barrel and saving the freight. Ours is the only deposit available for white cement on this coast.

"We have immense deposits of glass sand, analyzing 99% pure. The glass sand at present supplying the Pacific coast factories, comes from Belgium. At a conservative estimate, we will handle for the first year, around 20,000 tons of this material figured at $4.50 per ton.

"Most of the burned and hydrated lime consumed in this territory comes from Nevada and Arizona and sells here for about $15 per ton, we can easily handle 30,000 tons at $10 per ton and another 30,000 tons of lime rock for fertilization purposes, paper and sugar industry at $1.50 per ton.

"It will be reasonable to assume that with a million barrel capacity for the first year to supply a three million barrel market, the natural increase for the product a year hence will necessitate another thousand barrels per day output. This should indicate the important factor of safety in the enterprise, where rather than to spend another million dollars now from capital investment, let future improvements come from earnings.

"Most of us are familiar with the market south of us along Mexico, Central and South America, which last year used two and a quarter million barrels of cement, mostly from Europe, selling from $19 to $20 per ton. There is a nice profit in this business for us at $10 a ton, and on the basis of our freighting contract we can deliver cement in the southern markets for $5 per ton below our European competitors and when we figure this margin for only one half million barrels for the first year, we are not taking any chances.

"It will require 150 vessels, carrying from 200 to 1000 tons each and over 6000 freight cars annually to move this business.

"For the handling of this export business there are small fast motor vessels that can carry two or three thousand tons at close intervals and discharge right at the dock at any of the shallow ports. A good part of the business, however, will move in larger vessels in regular trade handling from 500 to 1000 tons, all loaded directly at our docks.

"Presuming a production of standard cement, 1,000,000 bbl.; 200,000 bbl. white cement, 20,000 tons glass sand, 30,000 tons burned and hydrated lime, 30,000 tons pure lime rock, total $3,635,000, it is interesting to know just what becomes of these dollars right here at home.

"For labor goes $363,500. The power suppliers get $181,750, fuel oil companies $400,000 and local railroads receive another $400,000. Quarry expense is around $363,000 and $254,00 is set aside for general repairs to the mill, etc. This runs around $1,963,000. Deduct this, if you please, from an income of $3,635,000 and we have left about $1,672,000. We have about 15c per barrel overhead and another few cents per barrel for taxes, etc.

"Another $150,000 to cover interest obligations on the preferred stock, still leaving us over a million and a half dollars in profits for distribution, part of which will be set aside for improvements to the plant and increased capacity.

"The vessels for our export trade will pay another $90,000 to the longshoremen and $43,000 for wharfage and handling on the dock. Add to this $133,000 our production receipts and you have a grand total of $3,768,000 distributed annually in your local trade channels, a third of which, going to our stockholders may be salted away.

"The following outline shows the exact per cent of funds to go under the various divisions:

ESTIMATE OF TOTAL RECEIPTS

1,000,000 bbls. standard cement at $2	$2,000,000
200,000 bbls. white cement at $6	1,200,000
20,000 tons glass sand at $4.50	90,000
30,000 tons burned and hydrated lime at $10	300,000
30,000 tons crushed lime rock at $1.50	45,000
	$3,635,000

DISTRIBUTION IN LOCAL TRADE CHANNELS

Labor at 10%	$363,500	
Power at 5%	181,750	
Fuel (oil) 11%	399,850	
Freights 11%	399,850	
Repairs at 7%	254,450	
Quarry expense 10%	363,500	1,962,900
Balance		$1,672,100
500,000 barrels—100,000 tons 100 to 150 vessels		
Longshoring 90c	$ 90,000	
Wharfage and handling at 43c	43,000	133,000
Total for distribution		$3,768,000

[The Editor, for one, would like it explained how it is possible "to distribute" more money for labor than the proposed operation is to take in for its product!]

Florida Portland to Operate at Full Capacity

ANNOUNCEMENT has been made that the Hookers Point, Fla., plant of the Florida Portland Cement Co. will soon be operated at full capacity for the first time since starting production in 1927, all three of the company's kilns being operated at full blast to care for orders for the first quarter of the year. Peak capacity of the plant is 1,650,000 bbl. of cement a year. This peak production is necessary if orders, already on the books for delivery during the first quarter of the year, are to be filled. This statement was made during the recent annual meeting of the company at Tampa, Fla., at which John L. Senior of Chicago was re-elected president of the company. All the other officers were re-elected.

During the year just closed reports showed that the Tampa plant's shipments showed a 50% increase for 1929 over 1928.

The company is planning an increase in the loading facilities of the plant here for export trade, involving an expenditure of $80,000 for docking improvements at its plant, which will not only speed the loading of steamers in export trade but also will permit any ship taxing the depth of the Tampa port channel, to berth along the company's 800-ft. dock.—*Tampa* (Fla.) *Tribune.*

Rush Equipment Replacements at River Products Plant

PLANS are announced for the immediate replacement of bins, screens and motors at the River Products Co. at Corlaville, Iowa, which were damaged in a $10,000 fire recently. Officials state that orders now on hand indicate a record plant output in 1930. George Dumphey is superintendent of the quarry. The plant employs 50 men.

Arkansas Lime Prospecting Texas Quarry Lands

THE Arkansas Lime Co. is reported to be making tests of limestone deposits in the vicinity of Clarksville, Tex., to determine their adaptability for the production of cement and commercial lime. The company owns plants in Georgia, Arkansas and Florida and if the quality of the rock here proves acceptable may erect a plant at Clarksville. An open shaft is being sunk to a depth of 50 ft., and examination is being made of the rock at frequent intervals. A plant such as the company would install here would employ about 50 men, according to R. B. Peters, foreman of the plant at Whitecliff, Ark., who is supervising tests.

Tests of local limestone deposits made by the state last year when the subject of erecting state-owned cement plants was being discussed showed the quality of the rock to be acceptable, and Clarksville was placed on the list of towns favorably considered as plant locations.—*Dallas* (Tex.) *Herald.*

Feldspar Grinders' Institute Elects New Officers

AT the recent first annual meeting of the Feldspar Grinders' Institute, held at the New York Athletic Club, the following new officers were elected:

President, H. P. Margerum, Consolidated Feldspar Corp.; vice-president, C. H. Peddrick, Jr., United Feldspar Corp.; vice-president, Herreld D. Thropp, Eureka Flint and Spar Co.; vice-president, James Turner, Trenton Flint and Spar Co.; secretary-treasurer, L. L. Hunt, Bedford Mining Co.

The above with the following three men make up the directorate of the Institute: Richard Wainford, Trenton Flint and Spar Co.; Norman G. Smith, Maine Feldspar Co.; M. G. McLear, Green Hill Mining Co.

Fused Cement Plant in Czechoslokavia

IN October of 1929 the Cizkovice plant of the Kralodvorske Cementarny akc. spol. began the production of a cement by the electro-process which was invented by the French engineer Bied. Until this plant began operation this cement was not manufactured in Czechoslovakia and could only be secured by importing it.

Harry W. Newton Leaves Portland Cement Association

HARRY W. NEWTON, who for the past several years has served the Portland Cement Association in the capacity of conservation engineer, has become affiliated with the crusher department of the Nordberg Manufacturing Co. of Milwaukee, Wis. His new duties will consist largely of special investigation work as applying to sales development of Symons cone crushers.

For a number of years he served in a similar capacity while with the Dorr Co., New York City. At one time he was engaged in private consulting engineering practice in Seattle, Wash., dealing particularly with mining and metallurgical operations in the north and northwest. His address will be at the Milwaukee office of the Nordberg company.

Frank Alonzo Wilder

FRANK ALONZO WILDER, geologist, college professor and founder of the Southern Gypsum Co., died at Abington, Va., on March 7, at the age of 68. Thus ends the career of a man whose rise to fame and fortune was ever an inspiration to the young men of America, particularly those engaged in the rock products industries.

Dr. Wilder was born at Akron, Ohio, in 1870 and received his early schooling at Monroe, Mich. He graduated from Oberlin College in 1892, resuming his studies at Yale University the following year, after which he entered the teaching profession at Fort Dodge, Iowa, as an instructor in science at the local high school. Keenly interested in the Iowa gypsum deposits which were even then of importance, Dr. Wilder had ample opportunity to make an exhaustive study of them when he became Iowa assistant state geologist in 1895. This work he completed in 1902 under the title of "Age and Origin of the Gypsum Deposits of Webster County, Iowa," following an absence of a year in Germany to study gypsum deposits and manufacturing methods in that country. The research served as his thesis for a doctor's degree at the University of Chicago, that institution granting him a Ph. D. degree in 1902. Then followed a year as state geologist of North Dakota and three years as professor of economic geology at the University of Iowa.

In the course of preparing his doctor's thesis, he ran across literature which indicated that there might be gypsum deposits of importance in southwest Virginia, and acting on the suggestion he conducted investigations which led to core drilling in the vicinity of North Holston. The results justified development, so with the assistance of an old friend of his college days, C. H. Ewing, Jr., Dr. Wilder organized the Southern Gypsum Co., which in the 20 years under his control flourished and became one of the most prosperous gypsum operations in the country. In 1927, he sold out to the Beaver Products Co. for a reported price of $1,000,000 and retired from active business to return as professor of geology at Grinnell College, Iowa. At the time of his death he was on leave of absence from that college.

Dr. Wilder was a fellow of the American Association for the Advancement of Science, member of the Geological Society of America, Society of Economic Geologists, and the Mineralogical Society and the publications of these societies were enriched by a number of valuable and comprehensive papers from him during his long career.

Bluffton Stone Selects Quarry Location

PURCHASE of 20 acres of land from the Mater farm as the location for Bluffton's new stone quarry was announced recently by officials of the Bluffton Stone Co., Bluffton, Ohio. The tract is located outside of the town limits along the right of way of the Nickel Plate railroad. In locating the quarry outside town limits, the company disposes of any possible claims to damage to buildings alleged to have been caused by quarry blasting.

Following announcement of the site, preparations are going forward for building operations and work preliminary to the opening of the quarry. A steam shovel recently has been installed and construction of necessary buildings for housing the crusher and other equipment will be started soon. A road providing an outlet locally for products of the quarry will also be constructed.

Plant operation is scheduled to begin about July 1. Shipments will be made locally and over the Nickel Plate.—*Bluffton News.*

Welded-On Overlays as An Attribute to Greater Operating Economies

An Outline of the Principal Uses as Well as the Methods of Applying Welded-On Overlays in Rock Products Industries

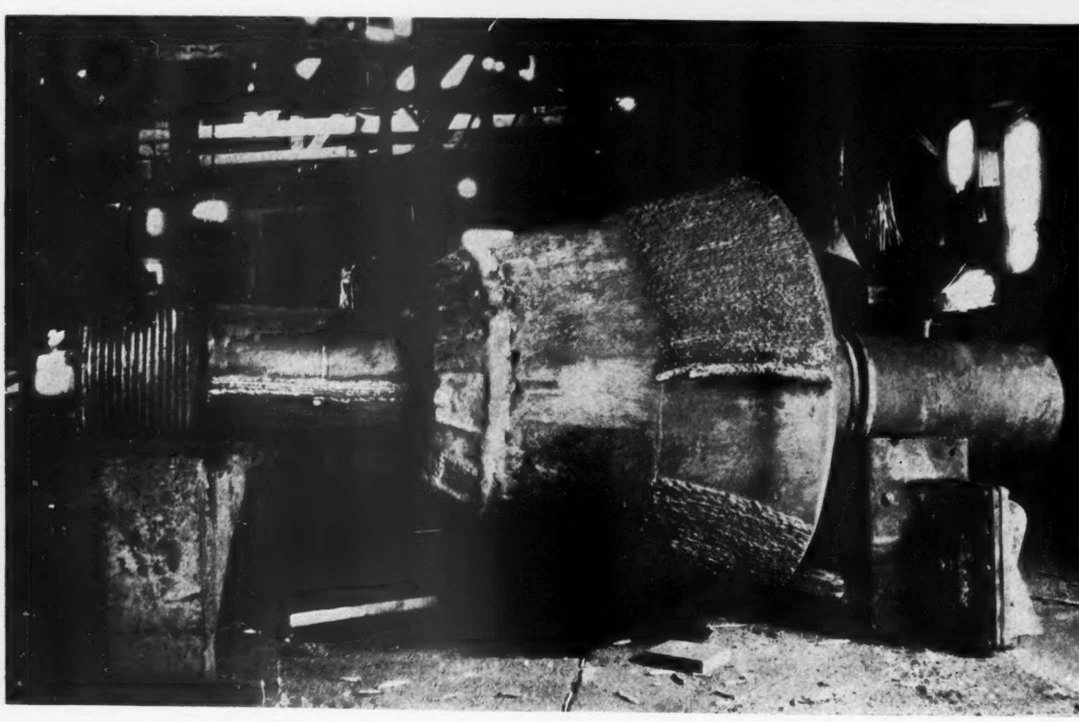
By Miles Catlin Smith
Mechanical Engineer, with Stoody Co., Whittier, Calif.

ASIDE from the petroleum exploration drilling industry, the rock products industries appear to have been foremost in the adoption of welded-on overlays as a solution to the obsolescence of equipment. Shovel teeth, bucket lips, crusher parts and various other machine and equipment units are successfully being protected against wear through abrasion by the welding on of an overlay of abrasive-resistant metallic alloy. In fact, the practice has progressed sufficiently far to merit a more or less technical discussion of the process and its possibilities, with a view to overcoming many of the obstacles which have so far been in evidence.

Prior to the adoption of welded-on overlays, and even since their introduction into the various phases of the rock products industries, steel containing a considerable percentage of manganese has been considered the one greatest abrasive-resistant material. Manganese steel is hard and is abrasive-resistant, but, like many other alloys of steel, it possesses quite strange characteristics. Manganese steel cannot be reforged—reheating manganese steel to any recognizable temperature has a tendency to ruin its structural strength to the point of excessive brittleness. Consequently, the practice has been to use the manganese steel parts as long as they would function at all and then discard them for new parts. However, manganese steel may be successfully overlayed, either before it is placed in service or to replace metal worn away in service, and the overlaying will increase the useful life of the manganese parts many times its unoverlayed capacity.

In the overlaying of manganese steel by

Welding on an overlay of abrasive-resistant metallic alloy on a large shaft



Showing the process of overlaying a gyratory crusher mantel

the welding process, a certain amount of precaution is necessary so that the manganese steel will not be injured structurally during the procedure. The one principal precaution is to keep the manganese steel cool; if possible cold, while the overlay is being welded on. There are many ways of accomplishing this, but in general the same procedure is used as would be followed in any manganese steel welding process. Intermittently splashing water over the part being welded, alternately welding on one side of the area to be covered, and then the other,

An overlay to protect a small area

and skip-welding, that is, welding a bead and then skipping a bead, which will be filled up later, are all good procedures. At times a combination of all three procedures is used in an effort to keep the metal as cool as possible. Furthermore, these mentioned methods are applicable whether the welding is being done with either the oxy-acetylene torch or the electric arc, but the greatest tendency to overheat the metal is present when the oxy-acetylene torch is used. With the electric welding arc it is quite possible to weld over a reasonably large area with only an occasional splashing with water and do little if any damage to the manganese steel.

An excellent application of welded-on overlay

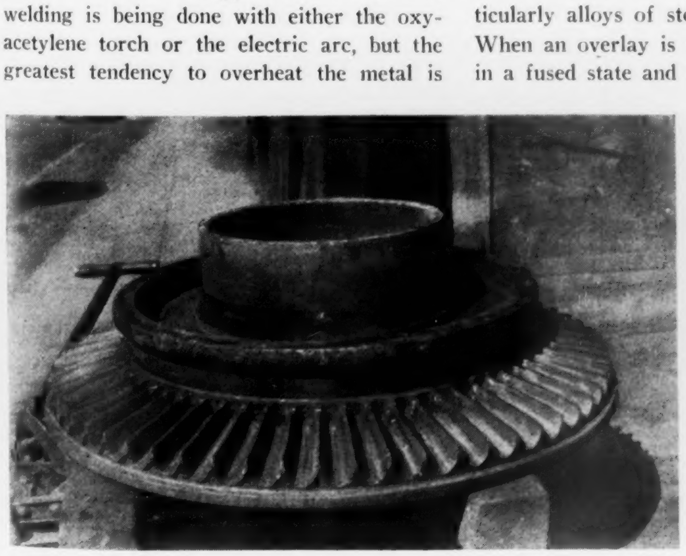
Clean Metal Essential

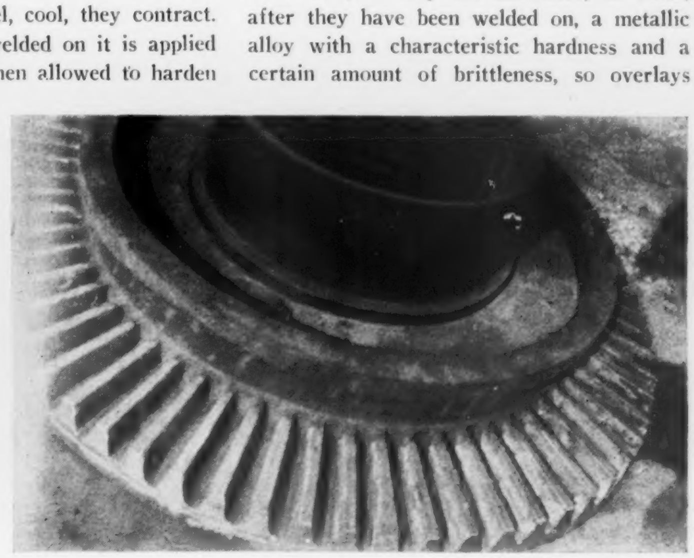
Other steels and cast-iron respond to very much the same process and procedure for welding on overlays. Any metallic surface to be overlayed must be clean. This applies to manganese steel as well as to other metals. By clean is meant, not just a haphazard brushing, but an actual cleaning by grinding or machining. Welded-on overlays may be successfully applied to surfaces that are not clean, but if the surface be thoroughly clean the results will be successful and the overlay will perform as it should. The reasons for this are quite self-evident; attempting to weld a layer of metal on a surface covered with oxide, slag and various other foreign substances cannot well help but end in either partial or total failure.

Excepting manganese steel, all metallic surfaces to be overlayed will respond much better to the procedure if they are heated to a dull red at the time of overlaying. If one stops to think, the reason for preheating is quite as self-evident as the reason for a clean surface. As hot bodies of metal, particularly alloys of steel, cool, they contract. When an overlay is welded on it is applied in a fused state and then allowed to harden and cool in the open air. If the metal overlayed be cold and already in the contracted state, the overlay which has amalgamated with the parent metal, in its attempts to contract will set up strains that could prove disastrous, either to the extent of shattering the overlayed part, or, if that be impossible, checking and cracking the overlay deposit. Should the overlay be applied to heated metal which is at the time expanded, and the overlay and the parent metal are permitted to contract simultaneously, no strains are set up and the results will be well worth the effort expended.

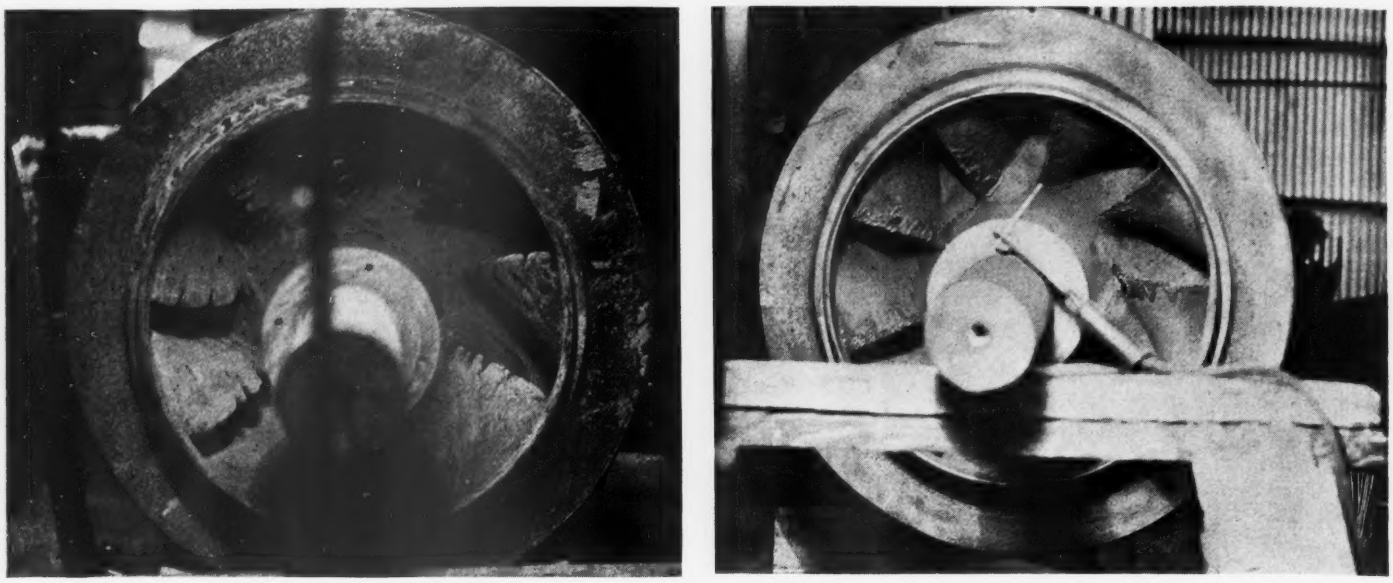
Thin Overlays Necessary

For the most part, welding rods, marketed for use in the welding on of overlays, either are, as they are marketed, or form, after they have been welded on, a metallic alloy with a characteristic hardness and a certain amount of brittleness, so overlays



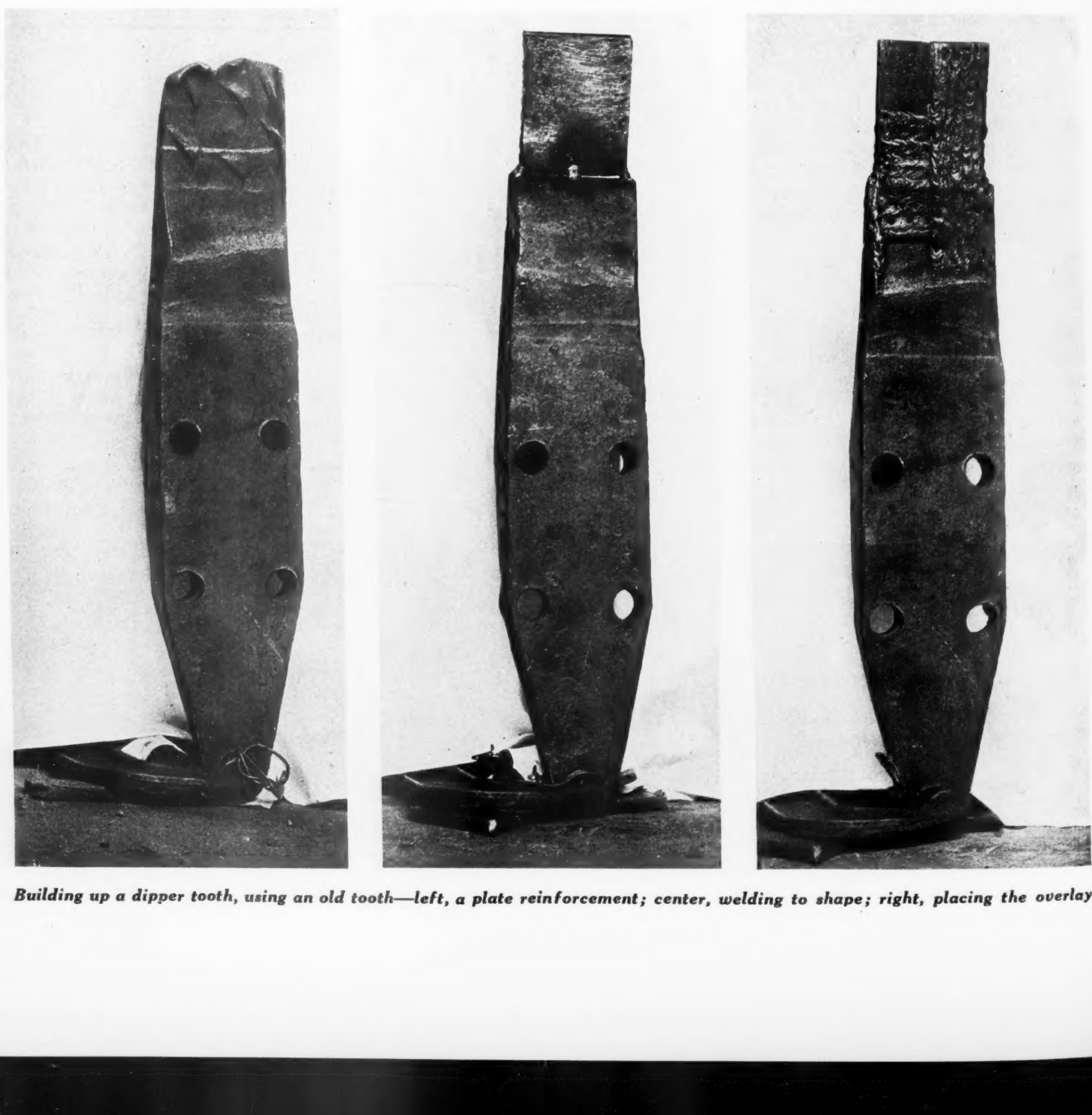


A badly worn gear and, right, the same gear after being restored to shape and protected against wear by a welded-on overlay



Dredge pump impeller before and after application of overlay

should be, in every sense of the word, overlays, not to exceed $\frac{1}{4}$ in. in thickness and always well supported by parent metal. Properly applied and well supported, welded-on overlays will withstand considerable pounding and abuse as well as abrasion, but if the overlay material be unsupported or be built to large sections it will be found entirely too brittle to withstand any pronounced



Building up a dipper tooth, using an old tooth—left, a plate reinforcement; center, welding to shape; right, placing the overlay

The finished tooth (see illustrations on bottom of p. 98.) showing the welded-on overlay in place

shocks. The harder the overlay, the more brittle it will be. At the outset, during the earliest days of welded-on overlays, their powers to resist abrasion were rated in proportion to the hardness of their deposits; but as the industry has advanced it has been proved that, while hard substances do resist abrasion, the brittleness which normally accompanies hardness is not desirable in a welded-on overlay. The trend now is to divorce the properties of hardness from resistance to abrasion and produce overlay materials, perhaps with less hardness, but certainly with less brittleness.

It is entirely unnecessary for the user of welded-on overlays to concern himself about the constituents of the overlays more than to ascertain that the overlay selected is easy to apply, has the desired characteristics for the particular application and that it will amalgamate well with the parent metal, so that it will endure in service. Insofar as the elements entering into the alloy or the percentages of each element are concerned, the user need pay little, if any, heed.

Welding Precautions

Much has been said and many theories advanced relative to the necessity for exercising care in the application of a welded-on overlay, so that the overlay metal will not be diluted by puddling it with the parent metal in the welding operation. Unless a welder is particularly careless and providing the overlay is properly compounded, this precaution need not be taken into consideration. The manufacturers of overlay materials have, in the proportioning of their materials, provided for a reasonable amount of dilution. In fact, the manufacturers of welded-on overlay materials have seen fit to carry practically all the load. They have so perfected their products that they will perform quite creditably, even though the application be, to some extent, carelessly executed. Any welder who is proficient enough to weld successfully with either the oxy-acetylene torch or the electric welding arc will have little or no trouble in applying a welded-on overlay if he follows the manufacturers' instructions.

Although welded-on overlays will perform best if they be applied before the overlayed parts are put in service, the tendency, at the present time, is to utilize the overlay in the rebuilding of worn parts. That is, the worn parts are welded back to their proper shape and then overlayed. When this is done, the one precaution is to utilize the overlay only as an overlay and use a carbon steel welding rod for the rebuilding, preferably a carbon steel rod with a high carbon content. With the steel rod, the worn part may be restored to its former or desired size and form and then the rebuilt part may be overlayed for its protection against further wearing away.

Since it is taken for granted that a welder, or at least an operator who has done some welding and who understands either or both of the autogenous fusion welding processes, will apply the welded-on overlay, it seems unnecessary to dwell upon the process of application. Particularly is this so, since the manufacturers of various welded-on overlay materials furnish quite complete working instructions for the application of their products. However, it is well to remember that the ultimate aim is the deposit of a thin layer or veneer of continuous welding beads and there is no necessity for other concern than the depositing of these welding beads upon the surface to be covered.

Equipment That May Be Overlayed

As to the type of equipment which is most applicable to the use of welded-on overlays, any metallic surface that is subjected to wear may be overlayed. Furthermore, that wear may be caused by contact with either nonmetallic or metallic substances. The one chief decision to be made is not whether the surface may be overlayed, but whether or not the surface may be profitably overlayed. Overlaying by the welding-on process is not an expensive operation and its utilization will prolong the useful life of machinery parts, yet, there are instances where overlaying is not, in every sense of the word, an economical procedure. That is, not at this stage of development of welded-on overlays. However, such instances are very much in the minority and, for the time being, may be

A welded-on overlay deposit on a dipper tooth

Welding on an overlay on a bucket lip

A dipper ready for service; the teeth have been resurfaced with a welded-on overlay

disregarded. Unless it has been conclusively proven otherwise, it is well to suppose that welded-on overlays will solve every problem of obsolescence resulting from wear in so far as nonmetallic mining and nonmetallic material handling are concerned.

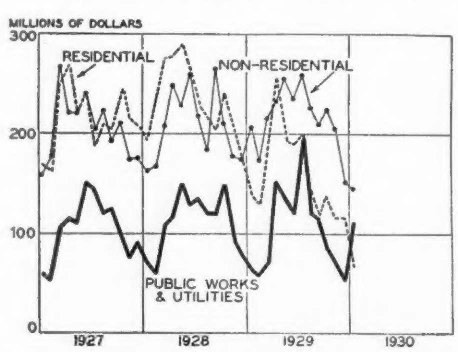
Power shovel teeth have been found particularly suitable to the use of welded-on overlays as have bucket lips, crusher mantels, etc., but there are probably hundreds of other applications in the same industry which are equally applicable, yet which have never been tried. It is quite difficult to list such other applications inasmuch as plants and operation methods vary, but, with the idea firmly entrenched in the mind of the plant and mill operators that welded-on overlays are designed to and actually will decrease the obsolescence through wear, it will not be difficult to recognize the proper places where the process should be employed.

In the utilization of welded-on overlays, particularly on new equipment or new designs, economies may often result from the adoption of other materials than those essential when the welded-on overlay is not used. By utilizing the overlay for securing the desired hard or abrasive or corrosive resistant surface, it is possible and most economical to construct of a material which will give the ultimate in strength with no regard to the desired surface. The parts may be heat treated for the ultimate in strength and then the overlay applied overlaying will, if properly applied, in no way interfere with or alter the effect of the heat treatment.

Welded-on overlays are approximately eight years old. Ordinarily, this would be considered a short period of trial and development, but welded-on overlays have been unique in that they have few failures to their credit and the accomplishments are a matter of industrial history. Starting with the petroleum exploration industry and following through the various other industries that have adopted welded-on overlays, this one process has been responsible for almost unbelievable economies. The further achievements of the process depend quite alone on its further adoption.

Status of the Construction Industry at a Glance

An increase of 2% occurred between December and January in the volume of building contracts awarded in the 37 states east of the Rockies that are included in the F. W. Dodge Corp. report, contrary to the usual tendency for building contracts to decline at that time of the year. The January total, however, was 21% smaller than a year ago, and in fact was the smallest for January of any year since 1925. The December to January increase was due to awards of public works and utilities contracts, which more than doubled between the two months. This is shown in the accompanying diagram which indicates the course of the three main groups of building work during the past three years. Residential building contracts, which have been on the decline ever since the first part of 1928, continued to diminish in January. Two years ago they constituted the largest main group of construction contracts, but since that time they have fallen from that position to a volume well below that of non-residential work, and even, in January, to a level below that of public works and utilities.



Amount of residential, non-residential, and public works and utilities contracts awarded in 37 states included in the F. W. Dodge Corporation report

The slight increase in building contracts reported for January does not appear to have continued in February. Daily average awards during the first three weeks of the month were well below the January level, and continued to show substantial decreases from a year ago.—*Monthly Review of the Federal Reserve Bank of New York.*

Super-Hard Facings for Bits

Special superhard metals for drill bits, tool facing, etc., are discussed by H. J. Morgan in a recent paper presented at the A. I. M. E. meeting in San Francisco, Calif. Tungsten carbide forms a basis of the hard metals discussed and the three main divisions of the products are compared. The second division, cast tungsten carbide, is manufactured in many shapes, principally as inserts which can be attached to bits by sticking them on and covering with hard facing metal. A third division corresponding to casehardening is applied by electric welding and gives a solid face with exceptional bond. It is applied in layers, the number of layers increasing according to the hardness desired. The author gives "Blackor" as an outstanding example, an ounce of which covers 5 sq. in., three layers giving a hardness of 9 or over. This is applied by any standard 100- to 200-amp. welding machine.

Other uses for "Blackor" mentioned besides bit facing are lining a centrifugal pump handling gravel, facing steam-shovel teeth, mill machinery, road graders, etc.

Lime in Petroleum Refining

In the refining of petroleum, lime is used to neutralize any organic acids present and to prevent them from passing over when the petroleum is distilled. Quicklime has the advantage of simultaneously retaining any water present in the petroleum, but hydrated lime is easier to handle and so is frequently used.—*Stone Trades Journal.*

Bluffton (Ohio) to Have Two New Quarry Plants

CONSTRUCTION of a new crushing plant at National Lime and Stone Co.'s Bluffton, Ohio, quarry will be started early this summer, according to a recent announcement in the *Lima* (Ohio) *Star*.

The new plant will be much smaller in size than the former main building destroyed last fall in a $200,000 fire that totally razed the structure and destroyed valuable machinery, and it will be designed principally to supply the local demand for stone. A temporary unloading plant will be erected at once to supply stone pending rebuilding of the plant.

During the past few months local newspapers have carried various reports to the effect that the plant would not be rebuilt, and recently a proposal was made to transform the abandoned quarry into a state fishing reservoir, as reported in ROCK PRODUCTS, March 1.

Co-incident with this announcement is one to the effect that the Bluffton Stone Co., a newly organized corporation, is going ahead with its plans for opening a quarry on a tract of 20 acres along the Nickel Plate right of way at Bluffton, Ohio. Unloading of machinery has begun and construction of a roadway to the quarry site will be started as soon as a grade at the railway crossing is established by the Nickel Plate.

Complete First Unit of New Inland Lime and Stone Plant

CONSTRUCTION of the first unit of the Inland Lime and Stone Co.'s new plant at Manistique, Mich., has been completed according to a recent report in the *Duluth* (Minn.) *Herald*. This construction involved the building of a large breakwater extending over 3500 ft. into Lake Michigan by the Merritt-Chapman-Scott Corp.

Contracts for crushing equipment to be installed at the plant have been awarded to Allis-Chalmers Manufacturing Co., Milwaukee, and include a 60-in. and 20-in. Superior type gyratory crushers, both to be driven by Texropes.

Oil City Gravel Company to Extend Operations

EXTENSIONS and improvements to docks and equipment that will involve an expenditure of more than $30,000 have been started by the Oil City Sand and Gravel Corp., Oil City, Penn., and will be completed within the next two or three months, according to an announcement by Capt. C. A. Smith, vice-president of the company.

The project calls for the construction of a new unloading dock 384 ft. in length at an estimated cost of $10,000, decking on all barges now in use at an estimated expenditure of approximately $8000 and purchase of two new steel barges at a cost of $7500 each. When completed the additions will increase the capacity plant from 70,000 to 140,000 tons of sand and gravel annually and give it most modern shipping facilities.

The new dock is to be of the same level as the one now in use. Decking of the barges to a height sufficient to allow water to drain back into the river will eliminate the second pumping operations used to drain the barges.—*Oil City* (Penn.) *Citizen*.

Florida Quarry Has Good Safety Record

THE Crystal River Rock Co., Crystal River, Fla., and engaged in quarrying lime rock, has completed a period of 361 working days without a lost-time accident. This dates from July 9, 1928, to October 10, 1929, and represents 18,000 man-days. A previous unfavorable accident experience forced the plant to organize for safety. Active interest in the prevention of accidents on the part of a competent safety engineer and the 50 employes of the plant has been responsible for this record. The accident terminating the record occurred to a steam shovel operator.—*National Safety News*.

New Company to Develop Ohio Gravel Property

NORTH KENOVA Development Co., Huntington, W. Va., has been organized with a capital of $75,000 to develop commercially a 700-acre tract of land located in Lawrence county, Ohio, opposite Huntington, W. Va. The incorporators and officers are: John T. McClintock, president; C. J. Rau, vice president; W. L. Ingerick, treasurer; Dolla D. Campbell, secretary, and W. R. Ritter.

The tract includes the Huntington, W. Va., airport operated by the Embry-Riddle Co. of Cincinnati. The drilling of oil and gas wells and the operation of a large gravel pit along the river bank will be among the projects. It also is planned to mine salt and bromine and by-products and quarry building stone and utilize the river for transportation purposes. — *Columbus* (Ohio) *Dispatch*.

Survey Large Granite Deposit in South Carolina

F. H. H. CALHOUN, consulting geologist, is reported to have surveyed near Jenkinsville a granite outcrop on the south bank of Holmes creek, about a mile off the main Columbia-Monticello highway, 25 miles from Columbia. It is stated that there is at least 5,000,000 tons of durable granite suitable for crushed rock, granite blocks and rubble. The deposit is as yet undeveloped.—*Manufacturers Record*.

Southern Gravel Corp. Buys North Carolina Property

THE plant and holdings of the Southern Sand and Gravel Co., located at Luarts on the Atlantic and Western railway, 20 miles east of Sanford, N. C., which was sold at a receiver's sale a short time ago to Julius H. Harden and E. L. Henderson of Burlington, has been sold by the purchasers to the Southern Gravel Corp. of Baltimore, Md., which will develop and operate the plant. The property includes approximately 500 acres, owned in fee simple and leases of sand and gravel deposits together with machinery.

The Southern Gravel Corp., organized under the laws of the state of Maryland, has an authorized capital of $400,000 and operates plants in Pennsylvania, Virginia and South Carolina. The officers are G. E. Norris, president and general manager; J. Peiper Winslow, treasurer, and W. H. Dempsey, Jr., secretary. Work will begin at once, and it is expected that within a few weeks the new company will begin making shipments. —*Greensboro* (N. C.) *News*.

A Public Spirited Quarry Company

PLANS for the beautification of Columbus, Ohio, received a tremendous boost through the recent announcement by the Marble Cliff Quarries Co. of its intention to donate 270 acres of land to the city for park and lake purposes. The local papers commented favorably on the gift, the *Columbus* (Ohio) *Dispatch* felicitating the donor and adding:

"This land, lying south of the Griggs dam and on the west side of the Scioto, is admirably adapted to the purpose for which it is offered. Title will pass to the city as soon as certain quarrying operations on the site are completed, and it may be assumed that the proposed park and lake development will begin with no material delay thereafter."

W. R. Macatee New District Engineer of P. C. A.

WALTER R. MACATEE has been appointed a district engineer for the Portland Cement Association, in charge of association work in Virginia and North Carolina, with headquarters at 904 East Main St., Richmond, Va.

For several years past Mr. Macatee has been engaged in road promotion throughout the southeastern states. During 1926, he was in charge of the P. C. A. district office at Jacksonville, Fla. He was then on a year's leave because of ill health, and took charge of the district office at New Orleans on January 15, 1928, from which point he was transferred to Richmond.

Mr. Macatee is a native of Virginia, and served as a captain in the World War.

The Rock Products Market

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Asbury Park, Farmingdale, Spring Lake and Wayside, N. J.	.48	.48	1.15	1.25	1.40	....
Attica and Franklinville, N. Y.	.75	.75	.75	.75	.75	.75
Boston, Mass.‡	1.25	1.15	1.75	....	1.75	1.75
Buffalo, N. Y.	1.00	.85	1.05	1.05	1.05	1.05
Erie, Penn.	.70	.95	1.40	1.40	....	....
Machias Junction, N. Y.	.75	.75	.75	....	.75	.75
Milton, N. H.	....	....	1.75	....	1.25	1.00
Montoursville, Penn.	1.00	.70	.60	.50	.50	.40
Northern New Jersey	.35– .50	.35– .50	1.25	.90–1.25	.90–1.25	....
South Portland, Me.	....	1.00	2.25	....	....	....
Georgetown, D. C.	.55	.55	1.20	1.20	1.00	1.00
CENTRAL:						
Appleton, Minn.	....	.50	1.25	....	1.50	....
Attica, Ind.			All sizes .75–.85			
Barton, Wis.	....	.40d	.50d	.60d	.60d	.60d
Beloit, Wis. (f)	.60	.30	.30	.40	.40	.40
Cincinnati, Ohio	.55	.55	.80	.80	.80	.80
Des Moines, Iowa	.40– .60	.60– .80	1.50–1.70	1.50–1.70	1.50–1.70	1.50–1.70
Eau Claire, Wis.	....	.55	.70	1.00	1.00	....
Elkhart Lake and Glenbeulah, Wis.	.40	.40	.60	.60	.60	.60
Grand Rapids, Mich.	.50	.50	.70	.80	.80	.70
Hamilton, Ohio	.90-1.20	.90–1.20	.90–1.20	.90–1.20	.90–1.20	.90–1.20
Hersey, Mich.	....	.50	....	.70	.70	.70
Humboldt, Iowa	.40	.40	1.25	1.25	1.25	1.25
Indianapolis, Ind.	.50– .75	.40– .60	.50– .75	.50– .75	.60– .85	.60– .85
Kalamazoo, Mich.	1.00	.50	.50	.60	.65	.75
Kansas City, Mo.	.70	.70	....	....	....	....
Mankato, Minn.	.55	.45	....	1.25	1.25	....
Mason City, Iowa	.50	.50	.80	1.25	1.25	1.25
Milwaukee, Wis.	.91	.91	1.06	1.06	1.06	1.06
Minneapolis, Minn.	.35	.35	1.25	1.25	1.25	1.25
St. Paul, Minn. (e)	.35	.35	1.25	1.25	1.25	1.25
Terre Haute, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.	....	.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	.50	1.10	1.00	1.00
SOUTHERN:						
Charleston, W. Va.	.70	1.25	1.25	....	....	....
Eustis, Fla.	....	.40– .50	....	....	....	....
Fort Worth, Texas	.75	.75	1.00	1.00	1.00	1.00
Knoxville, Tenn.	.85	1.00	1.20	1.20	1.20	1.20
Roseland, La.	....	.30	1.25	.80	.80	.80
WESTERN:						
Los Angeles, Calif.	.10– .40	.10– .40	.20– .90	.50– .90	.50– .90	.50– .90
Oregon City, Ore.	3.00–3.50g	1.00–1.50	1.00–1.50	1.00–1.50	1.00–1.50	1.00–1.50
Phoenix, Ariz. (c)	1.25*	1.15*	1.50*	1.15*	1.15*	1.00*
Pueblo, Colo.	.70	.60	....	....	1.20	1.15
Seattle, Wash.	1.00*	1.00*	1.00*	1.00*	1.00*	1.00*

*Cu. yd. ‡Delivered on job by truck. (c) 60-70% crusher boulders. (d) Plus 15c for winter loading. (e) Prices f.o.b. N. P. Ry. (f) Algonquin, Ill., district, 5c per ton higher. (g) Mason sand.

Core and Foundry Sands

Silica sand quoted washed, dried, screened unless otherwise stated; per ton f.o.b. plant.

City or shipping point	Molding, fine	Molding, coarse	Molding brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	2.75	2.75	2.85	....	....	4.00	....
Cheshire, Mass.		Sand for soap, 7.00–8.00				6.00–8.00	....
Eau Claire, Wis.	....	....	....	....	....	2.50–3.00	....
Elco, Ill.	Soft amorphous silica, 92%–99% thru 325 mesh, 18.00–40.00 per ton						
Franklin, Penn.	1.75	1.75	....	....	....	....	....
Kasota, Minn.	....	....	....	....	....	....	1.50
Montoursville, Penn.	....	....	....	1.35–1.60	....	....	....
New Lexington, Ohio	2.25	2.00	....	....	....	....	....
Ohlton, Ohio	1.75*	2.00*	....	2.00*	1.75*	1.75*	....
Ottawa, Ill.	1.25–3.25	2.25–3.50	1.25–3.25	1.25–3.25	1.25	3.50	3.50
Red Wing, Minn. (a)	....	....	....	....	1.50	3.00	1.50
San Francisco, Calif.	3.50†	5.00†	3.50†	2.50–3.50†	5.00†	3.50–5.00†	....

†Fresh water washed, steam dried. *Damp. (a) Filter sand, 3.00.

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio	....	1.50
Eau Claire, Wis.	4.30	1.00
Franklin, Penn.	....	1.75
Ohlton, Ohio	1.75	1.75
Ottawa, Ill.	1.25–3.25	1.25
Red Wing, Minn.	....	1.00
San Francisco, Calif.	3.50	3.50
Silica, Va.	....	1.75

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. plant.

Cheshire, Mass., in carload lots	5.00–7.00
Franklin, Penn.	2.25
Klondike, Mo.	2.00
Ohlton, Ohio	2.50
Ottawa, Ill.	1.25
Red Wing, Minn.	1.50
San Francisco, Calif.	4.00–5.00
Silica and Mendota, Va.	2.50–3.00

Bank Run Sand and Gravel

Prices given are per ton, f.o.b. producing plant or nearest shipping point.

Appleton, Minn.†	.55
Beloit, Wis.¶ (½-in. and less)	.30
Brewster, Fla. (sand, ¼-in. and less)	.40– .50
Burnside, Conn. (sand, ¼-in. and less)	.75*
Chicago, Ill.†	.92–1.20
Des Moines, Ia. (sand and gravel mix)	.60–1.05
Fort Worth, Tex.¶ (2-in. and less)	.65
Gainesville, Tex.¶ (1-in. and less)	.55
Gary and Miller, Ind.†	1.15–1.40a
Grand Rapids, Mich.¶ (2-in. and less)	.50
Hamilton, Ohio¶ (1½-in. and less)	.50–1.00
Hersey, Mich.¶ (1-in. and less)	.50
Mankato, Minn.†	.70
Oregon City, Ore.—All sizes at bunkers	1.00–1.50
Pueblo, Colo.—†River run sand	.50
Seattle, Wash.—Sand, 1/10-in. down, .25*; ¼-in. and less, same; gravel in sizes ranging from 2-in. and less to ½-in. and less	.25*
Winona, Minn.†	.60
York, Penn. Sand, ¼-in. and less, 1.00; 1/10-in. down	1.10

*Cubic yard. †Fine sand, 1/-10-in. down. (a) Cu. yd., delivered Chicago. ¶Gravel.

Current Price Quotations

ROCK PRODUCTS solicits volunteers to furnish accurate price quotations.

Portland Cement

	Per Bag	Per Bbl.	High Early Strength
Albuquerque, N. M.	.91¼	3.05	4.30¶
Atlanta, Ga.	....	1.99	3.49¶
Baltimore, Md.	....	2.26	3.56¶
Berkeley, Calif.	....	2.14	......
Birmingham, Ala.	....	1.65	3.15¶
Boston, Mass.	.57	1.78–1.88	3.27¶
Buffalo, N. Y.	.61¼	1.95–2.05	3.35¶
Butte, Mont.	.90¼	3.61	......
Cedar Rapids, Ia.	....	2.03–2.16	2.99f
Centerville, Calif.	....	2.14	......
Charleston, S. C.	....	2.09a	3.26¶
Cheyenne, Wyo.	.71½	2.26	......
Chicago, Ill.	....	1.75	3.25¶
Cincinnati, Ohio	....	1.92–1.94	3.44¶
Cleveland, Ohio	....	1.84–1.94	3.34¶
Columbus, Ohio	....	1.92–1.97	3.47¶
Dallas, Texas	....	1.65	3.14¶
Davenport, Iowa	....	1.94–2.04	......
Dayton, Ohio	....	1.94	3.44¶
Denver, Colo.	.63¾	2.55	......
Des Moines, Iowa	.48½	1.94	2.99f
Detroit, Mich.	....	1.75	3.25¶
Duluth, Minn.	....	1.84	......
Fresno, Calif.	....	2.33	......
Houston, Texas	....	1.75	3.38¶
Indianapolis, Ind.	.54¾	1.79	f3.19–3.29¶
Jackson, Miss.	....	2.09–2.29	3.59¶
Jacksonville, Fla.	....	2.14b	3.26¶
Jersey City, N. J.	....	2.13	3.43¶
Kansas City, Mo.	.48	1.92	f3.22–3.22¶
Los Angeles, Calif.	.36½	1.46	......
Louisville, Ky.	.55½	1.92	f2.92–3.42¶
Memphis, Tenn.	....	2.09–2.29	f3.55–3.59¶
Merced, Calif.	....	2.01	......
Milwaukee, Wis.	....	1.90	3.40¶
Minneapolis, Minn.	....	2.07	......
Montreal, Que.	....	1.60	......
New Orleans, La.	.43	1.82	3.22¶
New York, N. Y.	.60¾	1.93–2.03	3.33¶
Norfolk, Va.	....	1.87–1.97	3.27¶
Oklahoma City, Okla.	.59	2.36	3.66¶
Omaha, Neb.	.56½	2.26	3.56¶
Peoria, Ill.	....	1.92	3.32¶
Pittsburgh, Penn.	....	1.95	3.25¶
Philadelphia, Penn.	....	2.15	3.45¶
Phoenix, Ariz.	....	3.51	......
Portland, Ore.	....	2.30	......
Reno, Nev.	....	2.86	......
Richmond, Va.	....	2.16–2.32	3.62¶
Sacramento, Calif.	....	2.25	......
Salt Lake City, Utah	.70¼	2.81	......
San Antonio, Texas	....	......	3.42¶
San Francisco, Calif.	....	2.14	......
Santa Cruz, Calif.	....	2.10	......
Savannah, Ga.	....	2.09a	3.16¶
St. Louis, Mo.	.48¾	1.75	f3.00–3.25¶
St. Paul, Minn.	....	2.07	......
Seattle, Wash.	....	1.90	f2.85
Tampa, Fla.	....	1.80	3.41¶
Toledo, Ohio	....	2.00–2.03	3.50¶
Topeka, Kan.	.52¾	2.11	3.41¶
Tulsa, Okla.	.55¾	2.23	3.53¶
Wheeling, W. Va.	....	1.92–2.02	3.32¶
Winston-Salem, N. C.	....	2.14	3.54¶

Mill prices f.o.b. in carload lots, without bags, to contractors.

Albany, N. Y.	....	2.15	......
Bellingham, Wash.	....	2.25	......
Buffington, Ind.	....	1.70	......
Chattanooga, Tenn.	....	2.05	......
Concrete, Wash.	....	2.65	......
Davenport, Calif.	....	2.05	......
Hannibal, Mo.	....	1.90	......
Hudson, N. Y.	....	1.75	......
Leeds, Ala.	....	1.65	......
Lime & Oswego, Ore.	....	2.40	......
Mildred, Kan.	....	2.35	......
Nazareth, Penn.	....	2.15	......
Northampton, Penn.	....	1.75	......
Richard City, Tenn.	....	2.05	......
Steelton, Minn.	....	1.85	......
Toledo, Ohio	....	2.20	......
Universal, Penn.	....	1.70	......

NOTE: With exception of prices for "Incor" and "Velo" cement, prices quoted are net prices, without charge for bags, and all discounts deducted. Add 40c per bbl. for bags. (a) 44c refund for paid freight bill. (b) 38c bbl. refund for paid freight bill. (f) "Velo" cement, including cost of paper bag, 10c disc. 10 days. ¶"Incor" Perfected, prices per bbl. packed in paper sacks, subject to 10c disc. 15 days.

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chazy, N. Y.	.75	1.60	1.60	1.30	1.30	1.30
Farmington, Conn.	....	1.30	1.10	1.00	1.00	....
Ft. Spring, W. Va.	.35	1.35	1.35	1.25	1.15	1.10
Jamesville, N. Y.	.60	1.00	1.00	1.00	1.00	....
Oriskany Falls, N. Y.	1.00	1.25	1.25	1.25	1.25	1.25
Prospect Junction, N. Y.	.50- .80	1.15u	1.15	1.10	1.10	1.10
Rochester, N. Y.—Dolomite	1.50	1.50	1.50	1.50	1.50	1.50
Shaw's Junction, Penn. (e)	.85	1.20–1.35	1.20–1.35	1.20–1.35	1.40	1.30–1.35
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Alton, Ill. (b)	1.85	....	1.85	....	....	....
Cypress, Ill.	1.15	1.10	1.00	1.15	1.15	1.20
Davenport, Iowa	1.00	1.50	1.50	1.30	1.30	1.30
Dubuque, Iowa	1.00	1.00	1.20	1.10	1.10	....
Stolle and Falling Springs, Ill.	1.05–1.70	.95–1.70	1.15–1.70	1.05–1.70	1.05–1.70	....
Greencastle, Ind.	1.25	1.00	1.00	1.00	1.00	1.00
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
McCook, Ill.	.90	1.00	1.00	1.00	1.00	1.00
Montreal, Canada	.75–1.00	1.65–1.85	1.45	1.15	1.05	.95
Sheboygan, Wis.	1.00	1.00	1.00	1.00	....	....
Stone City, Iowa	.75	....	1.10	1.00	1.00	1.00h
Toledo, Ohio	1.60	1.79	....	1.60	....	1.60
Toronto, Canada (i)	2.70	2.70	2.50	2.50	2.50	2.50
Waukesha, Wis.	....	.90	....	.90	.90	....
Wisconsin points	.50	....	.100	.90	.90	....
Youngstown, Ohio	1.00	1.00	1.25	1.25	1.25	1.25
SOUTHERN:						
Chico and Bridgeport, Texas	.50	1.30	1.30	1.25	1.20	....
Cutler, Fla.	.50– .75r	....	....	1.75r	....	1.10g
El Paso, Texas	.50– .75	1.25	1.25	1.00	1.00	1.00
Olive Hill, Ky.	.50–1.00	1.00	1.00	.90	.90	.90
Rocky Point, Va.	.50– .75	1.40–1.60	1.30–1.40	1.15–1.25	1.10–1.20	1.00–1.05
WESTERN:						
Atchison, Kan.	.50	1.80	1.80	1.80	1.80	1.70
Blue Springs and Wymore, Neb. (t)	.25	.25	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.10	1.25	1.25	1.25	1.00	....
Richmond, Calif.	.75	....	1.00	1.00	1.00	....
Rock Hill, St. Louis, Mo.	1.45	1.45	1.45	1.45	1.45	1.45
Stringtown, Okla.	.50	1.30	1.30	1.25	1.20	....

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Penn. (q)	1.20	1.60	1.45	1.35	....	1.30
Branford, Conn.	.80	1.70	1.45	1.20	1.05	....
Duluth, Minn.	.90–1.00	2.25	1.75	1.75	1.25	1.25
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Texas	....	2.00	1.45	1.20	1.15	....
New Britain, Plainville, Rocky Hill, Wallingford, Meriden, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	....
Northern New Jersey	1.40	1.40	1.40–1.80	1.40–1.50	1.40	....
Richmond, Calif.	.70	....	1.00	1.00	1.00	....
Toronto, Canada (i)	4.70	5.80	....	4.05	....	....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Cayce, S. C.—Granite	.50	....	1.75	1.75	1.60	....
Chicago, Ill.—Granite	2.00	1.70	....	1.50	1.50	....
Eastern Pennsylvania—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Pennsylvania—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Emathla, Fla.—Flint rock	....	....	2.25–2.50s			
Lithonia, Ga.—Granite	.50	1.60	1.35	1.25	1.15	....
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	....
Middlebrook, Mo.—Granite	3.00–3.50	....	2.00–2.25	2.00–2.25	....	1.25–3.00
Richmond, Calif.—Quartzite	.75	....	1.00	1.00	1.00	....
Toccoa, Ga.—Granite	.50	1.35	1.35	1.25	1.25	1.20

(a) Limestone, ¼ to ⅛ in., 1.35 per ton; Lime flour, 8.50 per ton. (b) Wagonloads. (c) 1 in., 1.40. (d) 2-in., 1.30. (e) Price net after 10c discount deducted. (g) Per cu. yd., 3-in. and less. (h) Rip rap. (i) Plus 25c per ton for winter delivery. (n) Ballast, R.R., .90; run of crusher, 1.00. (q) Crusher run, 1.40; ¼-in. granlithic finish, 3.00. (r) Cu. yd. (s) 1-in. and less, per cu. yd. (t) Rip rap, 1.20–1.40 per ton. (u) ⅝-in. and less.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Allentown, Penn.	1.00–1.50	.40– .60	.80–1.00	.50– .80	.50– .80	.60– .80	.80
Bethlehem, Penn.	1.25–1.75	.50– .70	1.00–1.25	.60– .80	.70– .80	.70– .90	.90
Buffalo, N. Y., Erie and Du Bois, Penn.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Hokendauqua, Penn.	1.25–1.75	.60	.90	.60– .90	.60– .90	.60– .90	....
Reading, Penn.	2.00	1.00	....	1.00	....	....	....
Swedeland, Penn.	1.50–2.50	.60–1.10	1.00–1.25	.90–1.25	.90–1.25	1.25	1.25
Western Pennsylvania	2.00	1.25	1.25	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	....	1.30*	1.80*	1.55*	1.55*	1.45*	....
Jackson, Ohio	....	1.05*	1.80*	1.45*	1.30*	1.30*	....
Toledo, Ohio	1.50	1.10	1.35	1.35	1.35	1.35	1.35
SOUTHERN:							
Ashland, Ky.	....	1.05*	1.80*	1.45*	1.45*	1.45*	....
Ensley and Alabama City, Ala.	2.05	.55	1.25	1.15	.90	.90	.80
Longdale, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.05
Woodward, Ala.†	2.05	.55*	....	1.15*	.90*	.90*	....

5c per ton discount on terms. †1¼ in. to ¼ in., 1.05; ⅝ in. to 10 mesh, 1.25*; ⅝ in. to 0 in., .90*; ¼ in. to 10 mesh, .80*.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis, 98% $CaCO_3$; 0% $MgCO_3$, 90% thru 100 mesh	4.50
Belfast, Me.—Analysis, $CaCO_3$, 90.4%; $MgCO_3$, trace; 90% thru 100 mesh, per ton	10.00
Branchton, Penn.—94.89% $CaCO_3$; 1.50% $MgCO_3$, 100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh; per ton	5.00
Cape Girardeau, Mo.—Analysis, $CaCO_3$, 94½%; $MgCO_3$, 3½%; 90% thru 50 mesh	1.50
Davenport, Iowa — Analysis, 92-98% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; sacks, per ton	6.00
Gibsonburg, Ohio—Bulk, 2.25; in bags	3.70
Joliet, Ill.—Analysis, 50% $CaCO_3$; 44% $MgCO_3$; 90% thru 200 mesh	3.50
Knoxville, Tenn.—Analysis, 52% $CaCO_3$; 36% $MgCO_3$; 80% thru 100 mesh, bags, 3.75; bulk	2.50
Marion, Va.—Analysis, 90% $CaCO_3$, 2% $MgCO_3$; per ton	2.00
Middlebury, Vt.—Analysis, 99.05% $CaCO_3$; 90% thru 50 mesh	4.50
Olive Hill, Ky.	2.00

Agricultural Limestone

(Crushed)

Bedford, Ind.—Analysis, 98% $CaCO_3$; ½% $MgCO_3$; 90% thru 10 mesh	1.50
Chico and Bridgeport, Texas—Analysis, 95% $CaCO_3$; 1.3% $MgCO_3$; 90% thru 4 mesh	1.00
Colton, Calif.—Analysis, 95-97% $CaCO_3$; 1.31% $MgCO_3$, all thru 14 mesh down to powder	3.50
Cypress, Ill.—Analysis, 96% $CaCO_3$; 90% thru 100 mesh, 1.35; 50% thru 100 mesh, 1.25; 90% thru 50 mesh, 1.20; 50% thru 50 mesh, 90% thru 4 mesh and 50% thru 4 mesh, all	1.10
Davenport, Iowa — Analysis, 92-98% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 4 mesh, 50% thru 20 mesh; bulk, per ton	1.10
Dubuque, Ia.—Analysis, 34.96% $CaCO_3$; 59.62% $MgCO_3$; 90% thru 4 mesh	.95
Fort Spring, W. Va.—Analysis, 90% $CaCO_3$; 3% $MgCO_3$; 50% thru 100 mesh	1.50
Gibsonburg, Ohio—90% thru 10 mesh	1.00–1.50
Hillsville, Penn.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$; 75% thru 100 mesh, sacked	5.00
Jamesville, N. Y.—Analysis, 89% $CaCO_3$; 5% $MgCO_3$; 90% thru 100 mesh; in paper bags, 5.10; bulk	3.85
Lannon, Wis. — Analysis, 54% $CaCO_3$ 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio—90% thru 100 mesh	3.00
90% thru 50 mesh	2.00
90% thru 4 mesh	1.00
McCook and Gary, Ill.—Analysis, 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 4 mesh	.90
Olive Hill, Ky.—50% thru 4 mesh	1.00
Rocky Point, Va.—50% thru 200 mesh, bulk, in carloads, 2.00; 100-lb. paper bags, 3.25; 200-lb. burlap bags	3.50
Stolle and Falling Springs, Ill.—Analysis, 89.9% $CaCO_3$, 3.8% $MgCO_3$; 90% thru 4 mesh	1.15–1.70
Stone City, Iowa — Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
West Stockbridge, Mass.* — Analysis, 95% $CaCO_3$; 90% thru 100 mesh, bulk	3.50
100-lb. paper bags, 4.75; 100-lb., cloth	5.25
Waukesha, Wis.—90% thru 100 mesh, 4.00; 50% thru 100 mesh	2.10

*Less 25c cash 15 days.

Pulverized Limestone for Coal Operators

Davenport, Iowa—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; sacks, ton	6.00
Hillsville, Penn., sacks, 5.10; bulk	3.50
Joliet, Ill.—Analysis, 50% $CaCO_3$; 44% $MgCO_3$; 90% thru 200 mesh (bags extra)	3.50
Rocky Point, Va.—Analysis, 97% $CaCO_3$; 75% $MgCO_3$; 85% thru 200 mesh, bulk	2.25–3.50
Waukesha, Wis. — 90% thru 100 mesh, bulk	4.00

Lime Products

(Carload prices per ton f.o.b. shipping point unless otherwise noted)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime In bulk	Lump lime In bbl.
EASTERN:								
Berkeley, R. I.	....	....	11.40	....	....	17.50	....	20.65
Buffalo, N. Y.	....	....	....	12.00	....	....	....	....
Knickerbocker, Devault, Cedar Hollow and Rambo, Penn.*	....	9.50	9.50	9.50	....	9.50	8.50	....
Lime Ridge, Penn.	....	....	8.75	....	6.50	8.00[3]	5.00	....
CENTRAL:								
Afton, Mich.	....	....	....	....	....	10.75	7.50	....
Carey, Ohio	9.50	6.50	6.50	....	8.00	....	8.00	....
Cold Springs, Ohio	....	7.75	7.75	....	....	....	7.50	....
Gibsonburg, Ohio	10.50	....	7.75	....	7.00	9.00[9]	7.50	....
Huntington, Ind.	....	6.50	6.50	....	....	....	....	....
Little Rock, Ark.	....	14.40	....	14.40	....	....	11.90	....
Marblehead, Ohio	....	6.50	6.50	....	....	....	7.00	....
Milltown, Ind.	....	7.50–8.50	....	8.25–9.25	7.00[5]	9.25[6]	6.50[7]	....
Scioto, Ohio	10.50	7.50	7.00	8.00	....	....	7.00	15.00
Sheboygan, Wis.	....	10.50	10.50	10.50	....	....	9.50	....
Tiffin, Ohio	....	....	....	....	8.00	10.00	....	....
Wisconsin points	....	11.50	....	....	....	....	9.50	....
Woodville, Ohio	10.50	7.75	7.75	11.50[21]	7.00	9.00[9]	7.00	....
SOUTHERN:								
Keystone, Ala.	....	9.00	9.00	10.00	....	....	7.00	....
Knoxville, Tenn.	17.00	9.00	9.00	9.00	6.00	1.25[10]	6.00	....
Ocala, Fla.	....	11.00	....	....	....	....	....	....
Pine Hill, Ky.	17.00	9.00	9.00	9.00	6.00	1.25[10]	6.00	....
WESTERN:								
Kirtland, N. M.	....	....	....	....	....	....	12.00	....
Los Angeles, Calif.	....	....	....	....	....	....	12.00	....
San Francisco, Calif.	19.00	14.00–17.00	12.50	14.00–19.00	14.50[20]	....	11.00[19]	....
San Francisco, Calif.†	20.00	16.00	12.00	20.00	16.00	....	16.00	....

[1]Also 6.00. [2]To 1.35. [3]In 100-lb. bags. [5]To 7.50. [6]To 9.75. [7]To 7.00. [9]In 80-lb. paper. [10]Per bbl. [17]Less credit for return of empties. [19]To 14.50. [20]Also 13.00. [21]Superfine, 92.25% thru 200 mesh. *Price to dealers. †Wood-burnt lime.

Wholesale Prices of Slate

Prices given are f.o.b. at producing point or nearest shipping point

Slate Flour

Penn Argyl, Penn.—Screened, all thru 200 mesh, 7.00 per ton in paper bags.

Slate Granules

Esmont, Va.—Blue, $7.50 per ton. Granville, N. Y.—Red, green and black, $7.50 per ton.
Pen Argyl, Penn.—Blue-black, 6.00 per ton in bulk, plus 10c per bag.

Roofing Slate

Prices per square—Standard thickness.

City or shipping point:	3/16-in.	¼-in.	⅜-in.	½-in.	¾-in.	1-in.
Arvonia, Va.—Buckingham oxford grey	13.88	17.22	24.99	29.44	34.44	45.55
Bangor, Penn.—No. 1 clear	10.50–14.50	24.50	29.00	33.50	44.50	55.60
No. 1 ribbon	9.00–10.25	20.00	24.50	29.00	40.00	51.25
Gen. Bangor No. 2 ribbon	6.75–7.25	....	....	....	....	....
Gen. Bangor mediums	9.50–11.25	....	....	....	....	....
No. 1 Albion clear	9.00–10.50	16.00	23.00	27.00	37.00	46.00
Chapman Quarries, Penn.—No. 1	9.25–11.25	....	....	....	....	....
Medium	7.75–9.00	16.00	23.00	26.00	32.00	40.00
Granville, N. Y.—Sea green, weathering	14.00	24.00	30.00	36.00	48.00	60.00
Semi-weathering, green and gray	15.40	24.00	30.00	36.00	48.00	60.00
Mottled purple and unfading green	21.00	24.00	30.00	36.00	48.00	60.00
Red	27.50	33.50	40.00	47.50	62.50	77.50
Monson, Maine	19.80	24.00	....	....	....	....
Pen Argyl, Penn.*						
Graduated slate (blue)	....	16.00	23.00	27.00	37.00	46.00
Graduated slate (grey)	....	18.00	25.00	29.00	39.00	48.00
Color-tone	11.50–12.50; Vari-tone, 12.00–13.00; Cathedral gray, 14.00–15.00					
No. 1 clear (smooth text)	7.25–10.50; No. 1 clear (rough text), 8.25–9.50					
Albion-Bangor medium	8.00–9.00; No. 2 clear, 8.00–9.00; No. 1 ribbon, 8.00–8.50					
Slatedale and Slatington, Penn.—						
Genuine Franklin	11.25	22.00	26.00	30.00	40.00	50.00
Blue Mountain No. 1	10.50	22.00	26.00	30.00	40.00	50.00
Blue Mountain No. 1 clear	9.50	18.00	22.00	26.00	36.00	46.00
Blue Mountain No. 2 clear	8.00	18.00	22.00	26.00	36.00	46.00

(a) Prices are for standard preferred sizes (standard 3/16-in. slates), smaller sizes sell for lower prices.
(b) Prices other than 3/16-in. thickness include nail holes.
(c) Prices for punching nail holes, in standard thickness slates, vary from 50c to $1.25 per square.
*Unfading grey, 14.00–15.00; 10% disc. to roofer; 10%–8⅓% to wholesaler.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Chatsworth, Ga.:	
Crude talc, per ton	5.00
Ground talc (20-50 mesh), bags	6.50
Ground talc (150-200 mesh), bags	9.00
Pencils and steel crayons, gross	1.50–2.00
Chester, Vt.—Finely ground talc (carloads), Grade A—99-99¾% thru 200 mesh, 8.00–8.50; Grade B, 97-98% thru 200 mesh	7.50–8.00
1.00 per ton extra for 50-lb. paper bags; 166⅔-lb. burlap bags, 15c each; 200-lb. burlap bags, 18c each. Credit for return of bags. Terms 1%, 10 days.	
Clifton, Va.:	
Crude talc, per ton	4.00
Ground talc (150-200 mesh), in bags	12.00
Conowingo, Md.:	
Crude talc, bulk	4.00
Ground talc (150-200 mesh), in bags	14.00
Cubes, blanks, per lb.	.10
Emeryville, N. Y.:	
Ground Talc (200 mesh), bags	13.75
Ground talc (325 mesh), bags	14.75
Hailesboro, N. Y.:	
Ground talc (300-350 mesh) in 200-lb. bags	15.50–20.00
Henry, Va.:	
Crude (mine run)	3.50–4.50
Ground talc (150-200 mesh), bags	6.25–14.00
Joliet, Ill.:	
Ground talc (200 mesh) in bags:	
California white	30.00
Southern white	20.00
Illinois talc	10.00
Los Angeles, Calif.:	
Ground talc (150-200 mesh) in bags	16.00–25.00
Natural Bridge, N. Y.:	
Ground talc (325 mesh), bags	10.00–15.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Gordonsburg, Tenn.—B.P.L. 65-72%	3.75–4.25
Mt. Pleasant, Tenn.—B.P.L. 75%	6.25
Run of plant fines, 72% B.P.L., per ton of 2000 lb.	5.00

Ground Rock

(2000 lb.)

Gordonsburg, Tenn.—B.P.L. 65–70%	3.75–4.25
Mt. Pleasant, Tenn.—Lime phosphate: B.P.L. 73%	11.80
Mt. Pleasant, Tenn.—B.P.L., 72%	5.00–5.50

Florida Phosphate

(Raw Land Pebble)

(Per Ton)

Mulberry, Fla.—Gross ton, f.o.b. mines	
68/66% B.P.L.	3.15
70% minimum B.P.L.	3.75
72% minimum B.P.L.	4.25
75/74% B.P.L.	5.25
77/76% B.P.L.	6.25

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

Pringle, S. D.—Mine run, per ton	100.00–125.00
Punch mica, per lb.	.06
Scrap, per ton, carloads	20.00
Rumney Depot, Bristol and Cardigan, N. H.—Per ton:	
Mine scrap	22.50
Mine run	300.00
Clean shop scrap	27.50
Roofing mica	42.00
Trimmed mica, per ton, 20 mesh, 40.00; 40 mesh, 42.00; 60 mesh, 45.00; 200 mesh	100.00

Gypsum Products— CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gaging Plaster	Wood Fiber	Gaging White	Plaster Sanded	Cement Keene's	Finish Trowel	Plaster Board ¼x32x36". Per M Sq. Ft.	Plaster Board ⅜x32x36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10'. Per M Sq. Ft.
Acme, Tex.	1.50–3.00	4.00	4.00	4.00–6.00	4.00–6.00	4.00–6.00	10.00	10.00	19.00	19.00	10.50	10.50	12.00
Blue Rapids, Kan.	1.50–3.00	4.00	4.00	4.00–6.00	4.00–6.00	4.00–6.00	10.00	10.00	19.00	19.00	10.50	10.50	12.00
Centerville, Iowa	....	....	6.00	7.00	....	7.50	8.50	10.50a	....	....	....	....	....
East St. Louis, Ill.—Special Gypsum Products—Partition section, 4 in. thick, 12 in. wide, and up to 10 ft. 3 in. long, 12c per ft., 21.00 per ton; outside wall section and interior bearing wall section, 6 in. wide, 6 in. thick, and up to 10 ft. 3 in. long, 25c per ft., 30.00 per ton, floor section, 7 in. thick, 16 in. wide, and up to 13 ft. 3 in. long, 17c per ft., 23.00 per ton.													
Fort Dodge, Iowa	2.50	6.00	6.00	7.00	9.00	9.00	11.50	8.00	16.00	20.00	15.00	....	25.00
Grand Rapids, Mich.	....	....	....	....	9.00d	9.00d	....	8.00d	....	21.00d	....	15.00	25.00
Los Angeles, Calif. (b)	....	7.00–9.00	7.00–9.00	7.50–9.00	8.00–10.00	....	8.00–10.00	....	30.00c	....	....	....	....
Medicine Lodge, Kan.	1.40	....	....	....	....	....	11.50d	....	16.00d	11.50d	....	....	....
Portland, Colo.	....	7.00	7.00	9.00	9.00	9.50	9.00	....	27.50	....	22.50	27.50	....
Providence, R. I. (x)	....	....	....	12.00–13.00e	....	....	....	....	....	....	....	....	....
Seattle, Wash. (z)	6.00	9.00	9.00	13.00	....	....	14.00	....	....	....	....	....	....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	....	....	....	....	20.00	25.00g	33.00f

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable). (a) White molding. (b) Plasterboard, ¼x32x36-in., 14c-17c per sq. ft.; ⅜x32x36-in., 15c-18c per sq. ft. (c) To 40.00. (d) Includes paper bags. (e) Includes jute sacks. (f) "Gyproc," ⅜x48-in. by 5 and 10 ft. long. (g) ⅜x48-by 3 to 4 ft. long. (x) "Fabricaste" gypsum blocks, 2- and 3-in., f.o.b. motor trucks at plant, 7¼c-8¼c. Block setting plaster, per ton, in jute sacks, 12.00. (y) Jute sacks, 18.00; paper sacks, 16.00. (z) Gypsum partition tile, 3-in., 9c per sq. ft., 4-in., 11c per sq. ft.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt.—English pink, cream and coral pink	¶12.50–‖14.50	¶12.50–‖14.50
Cranberry Creek, N. Y.—Bio-Spar, per ton in bags in carload lots, 9.00; less than carload lots, 12.00 per ton in bags, bulk, per ton		7.50
Crown Point, N. Y.—Mica Spar		¶9.00–‖12.00
Davenport, Iowa — White limestone, in bags, per ton	‖6.00	‖6.00
Harrisonburg, Va.	12.50–14.50	
Middlebrook, Mo.—Red		20.00–25.00
Middlebury, Vt.—Middlebury white		¶9.00–‖10.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags		c5.50
Randville, Mich.—Crystalite white marble, bulk	4.00	4.00– 7.00
Stockton, Calif.—"Nat-rock" roofing grits		12.00–20.00
Tuckahoe, N. Y.—Tuckahoe white	8.00	
Warren, N. H.		8.00–15.00
Whitestone, Ga.		10.00

¶C.L. ‖L.C.L. (a) Including bags. (b) In burlap bags, 2.00 per ton extra. *Per 100 lb. (c) Per ton f.o.b. quarry in carloads; 7.00 per ton L.C.L.

Soda Feldspar

De Kalb Jct., N. Y.—Color, white; pulverized (bags extra, burlap 2.00 per ton, paper 1.20 per ton); 99% thru 140 mesh, 16.00; 99% thru 200 mesh, per ton 18.00

Potash Feldspar

Auburn and Topsham, Me.—Color white, 98% thru 140 mesh (bulk)	19.00
Keystone, S. D.—Color, white; analysis, K_2O, 13.25%; Na_2O, 1.92%; SiO_2, 63.50%; Fe_2O_3, .06%; Al_2O_3, 20.10%, pulverized 99% thru 200 mesh, in bags, 17.50; bulk	16.50
Crude, in bags, 9.50; bulk	8.50
Coatesville, Penn.—Color, white; analysis, K_2O, 12.30%; Na_2O, 2.86%; SiO_2, 66.05%; Fe_2O_3, .08%; Al_2O_3, 18.89%; crude, per ton	8.00
Erwin, Tenn.—White; analysis, K_2O, 10%; Na_2O, 2.75%; SiO_2, 68.25%; Fe_2O_3, .10%; Al_2O_3, 18.25%, pulverized 98% thru 200 mesh, in bags, 17.20; bulk	16.00
Crude, in bags, 8.50; bulk	7.50
Rumney and Cardigan, N. H. — Color, white; analysis, K_2O, 9-12%! Na_2O, trace; SiO_2, 64-67%; Al_2O_3, 17-18%, crude, bulk	7.00– 7.50
Rumney Depot, N. H.—Color, white; analysis, K_2O, 8-13%; Na_2O, 1-1½%; SiO_2, 62-68%; Al_2O_2, 17-18%, crude, bulk	7.00– 7.50
Spruce Pine, N. C.—Color, white; analysis, K_2O, 10%; Na_2O, 3%; SiO_2, 68%; Fe_2O_3, 0.10%; Al_2O_3, 18%; 99½% thru 200 mesh; pulverized, bulk	18.00

(Bags, 15c extra.)

Cement Drain Tile

Graettinger, Iowa. — Drain tile, per foot: 5-in., .04½; 6-in., .05½; 8-in., .09; 10-in., .12½; 12-in., .17½; 15-in., .35; 18-in., .50; 20-in., .60; 24-in., 1.00; 30-in. 1.35; 36-in. 2.00

Grand Rapids, Mich.—Drain tile, per 1000 ft.

4-in.	36.00
5-in.	48.00
6-in.	66.00
8-in.	100.00
10-in.	150.00
12-in.	210.00

Longview, Wash.—Drain tile, per 100 ft.

3-in.	5.00
4-in.	6.00
6-in.	10.00

Tacoma, Wash.—Drain tile, per 100 ft.

3-in.	4.00
4-in.	5.00
6-in.	7.50
8-in.	12.00

Chicken Grits

Centerville, Iowa	9.25
Belfast, Me.—(Agstone), per ton, in carloads	10.00
Chico, Tex.—Hen size and Baby Chick, packed in 100-lb. sacks, per ton	10.00
Coatesville, Penn.—(Feldspar), per ton, in bags of 100 lb. each	8.00
Cranberry Creek, N. Y.—Per ton, in carload lots; in bags, 9.00; bulk, 7.50. Less than carload lots, in bags	12.00
Davenport, Iowa — High calcium carbonate limestone, in bags L.C.L., per ton	6.00
El Paso, Texas—(Limestone) per 100-lb. sack	.75
Los Angeles, Calif.—Per ton, including sacks: Gypsum	7.50 –9.50
Middlebury, Vt.—Per ton (a)	10.00
Randville, Mich.—(Marble), bulk	6.00
Seattle, Wash.—(Gypsum), bulk, ton	10.00
Warren, N. H.	8.50– 9.50
Waukesha, Wis.—(Limestone), per ton	7.00
West Stockbridge, Mass.	¶7.50–‖9.00
Wisconsin Points—(Limestone), per ton	15.00

(a) F.o.b. Middlebury, Vt. ¶C.L. ‖L.C.L.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Barton Wis.	10.50
Dayton, Ohio	12.50–13.50
Detroit, Mich. (d)	e13.00–16.00*b
Farmington, Conn.	16.00
Grand Rapids, Mich.*	14.00–15.00
Jackson, Mich.	13.00
Madison, Wis.	12.50a
Mishawaka, Ind.	11.00
Milwaukee, Wis.	13.00*
Minneapolis, Minn.	10.00*
New Brighton, Minn.	8.00
Pontiac, Mich.	12.50
Portage, Wis.	15.00
Rochester, N. Y.	19.75
Saginaw, Mich.	13.50
San Antonio, Texas	12.50
Sebewaing, Mich.	12.50
South St. Paul, Minn.	9.00
Syracuse, N. Y.	18.00–20.00
Toronto, Canada (f)	10.50–13.00b
Winnipeg, Canada	15.00

Delivered on job. (a) Less 50c disc. per M 10th of month. (b) 5% disc., 10 days. (c) Delivered in city. (d) Also 15.50. (e) Also 14.00. (f) Also 11.00, f.o.b. cars at plant. (g) F.o.b. yard.

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point.

City or shipping point	Size 8x8x16
Camden, N. J.	16.50
Columbus, Ohio	14.00b–16.00†
Forest Park, Ill.	21.00*
Graettinger, Iowa	.18– .20
Indianapolis, Ind.	.10– .12a
Los Angeles, Calif.:	
4x8x12	4.50*
4x6x12	3.90*
4x4x12	2.90*

*Price per 100 at plant.

†Rock or panel face.

(a) Face. (b) Plain.

Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.:	
Red	15.00
Green	18.00
Cicero, Ill.—French and Spanish tile (red, orange, choc., yellow, tan, slate, gray) per sq., 9.50–10.00; green or blue, per sq.	11.50–12.00
Detroit, Mich.—5x8x12, per M	67.50
Houston, Texas—Roofing Tile, per sq.	25.00
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00

Cement Building Tile

Camden and Trenton, N. J.:	
3x8x16, per 100, 9.00; 3x9x16, per 100	9.00
4x8x16, per 100, 12.00; 4x9x16, per 100	13.00
6x8x16, per 100, 16.50; 6x9x16, per 100	15.50
Chicago District (Haydite):	
4x 8x16, per 100	13.00
8x 8x16, per 100	20.00
8x12x16, per 100	28.00
Columbus, Ohio:	
5x8x12, per 100	6.00
Houston, Texas:	
5x8x12 (Lightweight), per M	80.00
Longview, Wash.:	
4x6x12, per 1000	55.00
4x8x12, per 1000	64.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Camden & Trenton, N. J.	17.00	....
Chicago District "Haydite"	14.00	....
Columbus, Ohio	16.00	17.00
Ensley, Ala. ("Slagtex")	13.00a	....
Forest Park, Ill.	....	37.00
Longview, Wash.	16.50	20.00– 40.00
Milwaukee, Wis.	14.00	32.00
Omaha, Neb.	17.00	30.00– 40.00
Philadelphia, Penn.	15.50	....
Portland, Ore.	12.00	22.50– 55.00
Prairie du Chien, Wis.	14.00	23.00
Rapid City, S. D.	18.00	30.00– 40.00

(a) Delivered on job; 10.00 f.o.b. plant.

Fullers Earth

Prices per ton in carloads, f.o.b. Florida shipping points.

16– 30 mesh	20.00
30– 60 mesh	22.00
60–100 mesh	18.00
100 mesh and finer	9.00

Note—Bags extra and returnable for full credit.

Stone-Tile Hollow Brick

Prices are net per thousand f.o.b. plant.

	No. 4	No. 6	No. 8
Albany, N. Y.*†	40.00	60.00	70.00
Asheville, N. C.	35.00	50.00	60.00
Atlanta, Ga.	29.00	42.50	53.00
Brownsville, Tex.	....	53.00	62.50
Brunswick, Me.†	40.00	60.00	80.00
Charlotte, N. C.	35.00	45.00	60.00
De Land, Fla.	30.00	50.00	60.00
Farmingdale, N. Y.	37.50	50.00	60.00
Houston, Tex.	35.00	45.00	60.00
Jackson, Miss.	45.00	55.00	65.00
Klamath Falls, Ore.	65.00	75.00	85.00
Longview, Wash.	....	55.00	64.00
Los Angeles, Calif.	29.00	39.00	45.00
Mattituck, N. Y.	45.00	55.00	65.00
Medford, Ore.	50.00	55.00	70.00
Memphis, Tenn.	50.00	55.00	65.00
Mineola, N. Y.	45.00	50.00	60.00
Nashville, Tenn.	30.00	49.00	57.00
New Orleans, La.	35.00	45.00	60.00
Norfolk, Va.	35.00	50.00	65.00
Passaic, N. J.	35.00	50.00	65.00
Patchogue, N. Y.	....	60.00	70.00
Pawtucket, R. I.	35.00	55.00	75.00
Safford, Ariz.	32.50	48.75	65.00
Salem, Mass.	40.00	60.00	75.00
San Antonio, Tex.	37.00	46.00	60.00
San Diego, Calif.	35.00	44.00	52.50

Prices are for standard sizes—No. 4, size 3½x4x12 in.; No. 6, size 3½x6x12 in.; No. 8, size 3½x8x12 in. *Delivered on job. †10% disc.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4 in.	6 in.	8-in.	10 in.	12 in.	15-in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Grand Rapids Mich. (b)	......	......	......	.57	.67	.93	1.20	......	......	1.80	2.10	2.25	3.35	4.00	5.60	6.90	7.85
Houston, Texas	......	.19	.28	.43	.55½	.90	1.30	......	1.70†	2.20	......	......	......	......	......	......	......
Indianapolis, Ind. (a)	......	......	......	.75	.85	.90	1.15	......	......	1.60	......	2.50	......	......	......	......	......
Norfolk, Neb. (b)	......	......	......	.90	1.00	1.13	1.42	......	......	2.11	......	2.75	3.58	......	6.14	......	7.78
Tiskilwa, Ill. (rein.)	......	......	......	.75	.85	.95	1.20	1.60	......	2.00	......	2.75	3.40	......	6.50	......	10.00
Tacoma, Wash.	.15	.17	.22½	.30	.40	.55	.70	......	......	......	......	......	......	......	......	......	......
Wahoo, Neb. (b)	......	......	......	......	.85½	......	1.14	......	......	1.81	......	2.47	3.42	4.13	5.63	6.49	7.31

(a) 24-in. lengths. (b) Culvert; 21-in., 1.43. †21-in. diameter.

Sand-Lime Brick Production and Shipments in February

THE following data are compiled from reports received direct from 20 producers of sand-lime brick located in various parts of the United States and Canada. The number of plants reporting is two less than those furnishing statistics for the January estimate, published in the February 15 issue. The statistics below may be regarded as representative of the entire industry, the reporting plants having about one-half the production capacity in the United States and Canada.

As in the previous month, February showed little activity in the sand-lime brick field. Reports indicate that production was even lower than in January, and 10 plants reported no production at all. Shipments by rail and truck increased somewhat, as did unfilled orders, while stocks on hand decreased considerably.

Average Prices in February

The following are average prices quoted for sand-lime brick in February:

Shipping Point	Plant Price	Delivered
Atlantic City, N. J.	$12.00	$17.50
Boston, Mass.	11.00	15.00
Dayton, Ohio	12.50	15.50
Detroit, Mich.	13.00	15.00@16.00
Detroit, Mich.	....	15.50
Grand Rapids, Mich.	....	14.00@15.00
Jackson, Mich.	13.00	....
Milwaukee, Wis.	10.50	13.00
Pontiac, Mich.	12.50	15.50
Saginaw, Mich.	12.00	....
Syracuse, N. Y.	18.00	20.00
Toronto, Can.	11.00	13.00
West Toronto, Can.	....	13.00
Winchester, Mass.	....	16.00

The following statistics are compiled from data received from 20 producers in the United States and Canada:

Statistics for January and February

	*January	†February
Production	6,586,000	4,660,000
Shipments (rail)	2,356,000	2,449,000
Shipments (truck)	3,686,000	3,503,000
Stock	13,691,000	10,166,000
Unfilled orders	7,904,000	8,873,000

*Revised to include five plants not reporting in statistics published in February 15 issue. Twenty-two plants reporting. Incomplete, one plant not reporting stocks on hand and six plants not reporting unfilled orders.

†Twenty plants reporting. Incomplete, one plant not reporting production, three not reporting stocks on hand, and nine not reporting unfilled orders.

Notes from Producers

Jackson Brick Co., Jackson, Mich., reports that its plant has now resumed operations after a temporary shutdown for overhauling and replacement of needed equipment.

New Rating in New Jersey

The schedule rating office of New Jersey has announced that sand-lime brick is to get the same insurance rating as clay brick. This decision is based on the rating office's recent analysis of various tests of sand-lime brick made by the United States Bureau of Standards and the Underwriters' Laboratories.

Herman E. Neal

HERMAN E. NEAL, president of the Neal Gravel Co., Mattoon, Ill., and prominent in civic life of that community, died at his home after several weeks illness. Heart trouble from which he had suffered for some time, was the cause.

Mr. Neal was born in Jasonville, Ind., in 1881, attended school at Farmersburg, Ind., and later in Terre Haute.

In 1900, Mr. Neal entered the service of Hulman and Co., wholesale grocers of Terre Haute and Mattoon, and for several years he was a traveling salesman, covering territory adjacent to Mattoon.

Herman E. Neal

In 1907, Mr. Neal was sent to Mattoon by the Hulman organization to assume the management of its local branch, and since that time he had made his home in this city.

The Neal Gravel Co., of which Mr. Neal was president, was organized in 1904 by Mr. Neal and his brother, and from a small beginning the business grew until in January of 1916 it had reached such proportions that Mr. Neal resigned his connection with Hulman and Co. and became president of the gravel company, the position he held at the time of his death.

An ardent supporter of civic and community affairs, Mr. Neal was a member of the Central Community church, the Masonic lodge, the Rotary Club, and of the board of directors of the National Bank of Mattoon.

Elkhart-Moraine Gravel Co. Celebrates 20th Anniversary

ONE Wisconsin sand and gravel company which has grown and prospered, despite of much competition from side-of-the-road country-owned and contractor-owned plants, is the Elkhart-Moraine Sand and Gravel Co., Elkhart Lake, Wis. It has prospered, apparently, because it has concentrated on service and quality at prices, including freight, that even side-of-the-road operations have had difficulty in meeting, if their costs are honestly kept.

This year the Elkhart-Moraine Sand and Gravel Co. is celebrating its 20th anniversary, 1910-1930. During that period 5,000,000 tons have been mined and marketed. The company has plants at Glenbeulah on the Chicago and Northwestern railway and at Elkhart Lake on the Chicago, Milwaukee, St. Paul and Pacific railway. L. L. Laun is sales manager at Elkhart Lake. The capacity of the two plants is 5000 tons per day, and Mr. Laun reports that he expects a good year in 1930, and is planning to expand in 1931.

The company produces and markets screened and washed concrete sand, mason sand, asphalt sand, oil topping sand and golf course sand; roofing gravel, pea gravel, ballast and bank-run gravel; gravel in ½- to ¾-in sizes for steel reinforcing; 1- to 1½-in. for building; 2- to 2½-in. for paving.

Sand-Lime Brick in 1928

FINAL statistics of sand-lime brick production in 1928 have just been released by the United States Bureau of the Census. Between 1926 and 1928 the number of common clay brick plants was reduced from 1223 to 1080, and the production from 7,517,211 thousands to 6,412,810 thousands; a loss of 11.6% in number of plants and 14.6% in production. In the same period sand-lime brick operations were reduced from 42 to 41 and production from 330,586 thousands to 313,553 thousands; a loss in number of plants of 2.4% and in production of 5.2%. So sand-lime brick is more than holding its own in the declining markets of recent years.

PRODUCTION, BY QUANTITY AND VALUE, AND STOCKS, FOR THE UNITED STATES, 1928, 1927 AND 1926, AND BY STATES, 1928

States	Number of establishments	Quantity (thousands)	Value	Stocks on hand December 31 (thousands)
United States				
1928	41	313,553	$3,654,590	21,018
1927	47	319,618	3,645,842	25,075
1926	42	330,586	3,981,492	22,033
States, 1928				
Florida	3	6,327	57,866	185
Michigan	12	103,056	1,270,778	5,854
Other states:*				
Connecticut, District of Columbia, Massachusetts, New Jersey	7	86,203	970,114	6,183
Louisiana, Texas	3	6,289	78,612	525
Minnesota, Missouri	3	18,011	177,138	2,416
Indiana, New York, Ohio, Pennsylvania	8	67,185	818,031	3,875
California, South Dakota, Utah, Wisconsin	5	26,482	282,051	1,980

*California, 1 establishment; Connecticut, 1; District of Columbia, 1; Indiana, 1; Louisiana, 1; Massachusetts, 2; Minnesota, 2; Missouri, 1; New Jersey, 3; New York, 4; Ohio, 2; Pennsylvania, 1; South Dakota, 1; Texas, 2; Utah, 1; Wisconsin, 2.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Manufacture of Art Objects of Colored Cement

Part IV—Fixing Hanging Chains, Rings and Hooks to Cement Objects

By George Rice
Palo Alto, Calif.

IRON, steel, brass and various other kinds of metal chains, rings and hooks are used for suspending cement objects or for giving them an artistic appearance. When these are used to support a hanging object they are securely attached in the cement body so as to hold its weight. When they are used for ornamental purposes, the attaching devices are but lightly fixed in the cement structure, and the metal devices are permitted to drape over the surfaces of the object in the most attractive way. The strongest kind of union is made when the chain rod or other metal connection is passed entirely through the cement body. In this case the mold has to be arranged for the purpose. An opening is made on each side of the mold through which the chain or rod is passed and the cement mixture can then be poured completely about them during the process of casting the object. As neither the chain nor the rod will entirely fill the side holes made in the mold for their passage, it will be necessary to make these holes tight with wax or clay to prevent the soft cement from running out.

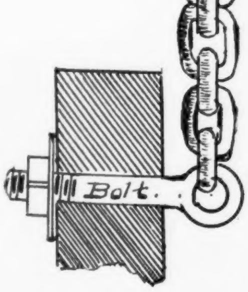


Fig. 1. Bolt and nut method of securing the chain

Fig. 2. Showing the bolt with its expanded head sunk into the cement

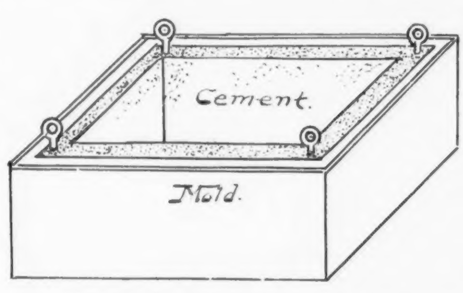


Fig. 3. Chain bolts can be set in place during the making of the cement box

Setting the Bolt

The bolt and nut method often is used on the plan shown in Fig. 1. A hole is drilled through the cement and a bolt which is joined to a chain is inserted and tightened therein with a nut. Another method is shown in Fig. 2 in which a bolt with its head spread out disk shape is used and is sunk into the soft cement while the object is still in the mold. Bolts thus set into the cement will retain their grip under heavy stresses. They will hold until the cement is broken.

Threaded Bolt Method Also Reliable

The threaded bolt method of securing a ring bolt to the corners of a cement box in process of casting frequently is used. Boxes of this type often are made by spreading the cement in the mold with a tool designed for the purpose. It is much like a trowel or palette knife. Instead of pouring soft cement into the mold and depending upon a center piece to form the hollow of the box, the cement is made stiff enough to allow pressing it up against the sides of the mold where it will stay in place and harden. This cannot be done with small boxes, but is possible with boxes in which the interior is large enough to permit using the trowel. The ring bolts are placed in their proper positions as the cement sides are built up and the chains can be connected. Or the ring bolts can be set with the chains already joined to them, and the latter drooped over the sides of the mold out of the way while the cement is being trowelled into shape. Fig. 4 shows a cement flower box with its ring bolts and hanging chains.

(To be continued)

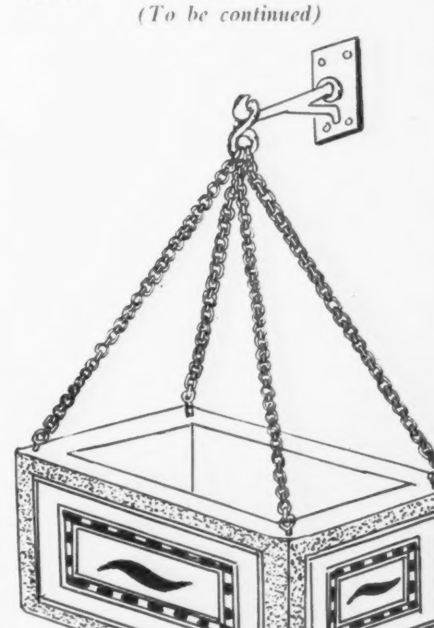


Fig. 4. A distinctive cement flower box with its ring bolts and hanging chains

American Railway Engineering Association Discards Quality Rating of Ballast

AS USUAL, the annual convention of the American Railway Engineering Association at Chicago, March 12, in the session on ballast, discussed matters of considerable interest to ballast producers, this year more than ever because of the action of the association, on the recommendation of the ballast committee, in discarding its long standing table of the comparative merit of material for ballasting in the association's "Manual." This has been a feature of the Manual of the American Railway Engineering Association for many years and the action of the association in discarding it is of particular interest.

The Manual has rated the quality of ballast in seven classifications:

(1) Stone, rating trap rock first, limestone next and sandstone third
(2) Washed gravel
(3) Slag, giving slag three classifications according to its origin and method of preparation
(4) Screened gravel
(5) Pit-run gravel
(6) Chats
(7) Cinders

The committee stated that its action was based on a questionnaire sent out to 90 railroads in the United States and Canada to which 75 replies were received. Of the 75 replies, 22 advised that in their opinions the order of merit as shown in the Manual was correct. The remaining 53 replies covered almost every conceivable way of placing the order of merit, and very few were alike. It therefore seemed that while the order of merit shown in the Manual was not satisfactory, it was probably the best rating that can be obtained.

A careful analysis of the replies received to the questionnaire made it evident to the committee that the order of merit of the different ballasting materials is based solely on the opinions of the men whose judgment is guided by the ballast with which they have had experience and found necessary under existing circumstances to use. The committee therefore felt that the order of merit and comparative merit of ballast materials should be based on some of the following factors:

(1) Availability of material
(2) Character and density of traffic
(3) Condition of road grade or sub-grade
(4) Cost

The committee reported that it was evident when these conditions are taken into consideration that it was almost impossible to arrive at any given order of merit or comparative merit of the different ballast materials. It was therefore recommended to the association (and unanimously adopted by the association) that the subject of comparative merit of material for ballast be eliminated from the Manual.

Another action of the association was to eliminate the term "washed and screened gravel" ballast and substitute for it "prepared gravel," which is defined as "a gravel from which dirt, dust, loam and foreign matter has been removed and the residue washed, screened or crushed to meet specifications."

The committee will continue its work on the following subjects:

(1) Revision of the Manual
(2) Conduct tests and continue study of prepared gravel ballast to determine the best method of testing for hardness, abrasion and resistance to weathering in order to provide specifications therefor
(3) Continue to study and report on comparative merits of ballast materials and their effect on operating costs, collaborating with the committees on roadway and track
(4) Continue study and report on shrinkage of ballast
(5) Determine the answer to the question: What is ballasted track?
(6) Review and report revisions, if necessary, in specifications for prepared gravel ballast
(7) Make critical study of the cause and effect of pumping joints in railway track and the excess cost of maintenance resulting therefrom, with suitable recommendations for removal of cause, collaborating with committees on roadway, rail and track.

The chairman of the committee highly commended the work of the laboratory of the National Sand and Gravel Association in making tests for hardness, abrasion and resistance for the sub-committee on gravel ballast, of which Stanton Walker, director of the bureau of engineering of the National Sand and Gravel Association, is a member.

The tests made by the National Sand and Gravel Association were briefly outlined as follows:

Description of Samples and Outline of Tests

For the purpose of carrying out the tests, samples of gravel were selected from 16 different plants regularly furnishing railroad ballast. Table 1 gives a list of the samples and a brief description of them.

The following tests have been carried out on each sample:

Miscellaneous Tests

(1) Sieve analyses as received.
(2) Determination of percentage of crushed particles.
(3) Weight per cubic foot measured loose and measured dry and rodded.
(4) Apparent specific gravity.
(5) Absorption.

Hardness and Strength

(6) Percentage of wear in Deval abrasion test.
(7) Determination of resistance to crushing.

The following data are yet to be collected on these samples:

(1) Information as to satisfaction given in actual service.
(2) Soundness by sodium sulphate test.
(3) Soundness by boiling water test.
(4) Miscellaneous tests suggested by future investigations.

If the results of the tests outlined above furnish information which seems to be of value, samples will be collected and the tests carried out on them.

Miscellaneous Tests

The sieve analyses were carried out on sieves with square openings in accordance with the "Standard Method of Test for Sieve Analysis of Aggregates for Concrete" (Serial Designation: C 41—24) of the American Society for Testing Materials. See A. S. T. M. Standards, 1927, page 124.

The percentage of crushed particles in each sample was determined by considering as crushed any particle with one or more crushed faces. This is in accordance with the recommendations in the "Tentative Method of Test for Abrasion of Gravel" (Serial Designation: 289-28-T) of the American Society for Testing Materials. See 1928 Proceedings American Society for Testing Materials, page 940.

The weights per cubic foot, dry and rodded, were determined in accordance with the "Standard Method of Test for Unit Weight of Aggregate for Concrete" (Serial Designation: C-29-27) of the American Socity for Testing Materials. See A.S.T.M. Standards, 1927, page 120. A measure of one-half cubic foot capacity was used. The unit weight loose was determined by shoveling the gravel into the one-half cubic foot measure with a small scoop, care being taken to avoid compacting.

The apparent specific gravity was determined in accordance with the "Standard Method of Test for Apparent Specific Gravity of Coarse Aggregates" (Serial Designation: D 30—18) of the American Society for Testing Materials. See A.S.T.M. Standards, 1927, page 466.

The absorption test was made by immersing a 1000-gram sample in water at room temperature for 24 hours and then drying to constant weight.

Hardness and Strength

Most of the research work for the purpose of developing methods of measuring the hardness and strength of gravel has been carried out in connection with studies of concrete. A recent study made by one of the committees of the American Concrete Institute, and a number of discussions presented in a symposium on mineral aggregates at the annual meeting of the American Society for Testing Materials, indicate a serious lack of information which would justify definite recommendations for test methods or specification limits.

The Deval abrasion test was made in accordance with the "Tentative Method of Test for Abrasion of Gravel" (Serial Designation: D-289—28-T) of the American Society for Testing Materials, using samples from which all crushed particles were removed and proportioned by square mesh sieves in accordance with the Grading B outlined in that method. See 1929 Proceedings American Society for Testing Materials, page 940. The B grading is as follows: :

1-1½ in.	50%
¾-1 in.	25%
½-¾ in.	25%

This grading was selected as the one

which could be most conveniently fitted to all of the samples.

The crushing test was made by loading a sample of graded gravel in a cast iron measure approximately 6 in. in diameter and 6 in. deep by means of a loose-fitting piston. A load of 3000 lb. per sq. in. was applied at a uniform rate of 100 lb. per sq. in. per second on a 3000-gram (6.6 lb.) sample graded as outlined above for the Deval tests. The reduction in fineness modulus and in volume of voids due to the application of the load was determined.

Test Data

The results of the miscellaneous mechanical tests of the samples are given in Table 2 and the results of the physical tests of the samples are given in Table 3.

Additional data of value giving the results of abrasion and toughness tests of 17 different gravels are given in the 1926 report of the Committee on Washed Gravel Ballast of the National Sand and Gravel Association. The grading of the samples for the earlier tests were different than for those included in this report.

Concluding Remarks

This report includes data of a nature which should be considered in drafting a specification for "hardness and resistance to abrasion" of gravel ballast. It is not believed, however, that sufficient information is available to justify fixing specification limits. The study of service records of the materials should be made before specification limits are decided upon.

Another report of the sub-committee on prepared gravel ballast recommended that the present specifications appearing in the Manual be withdrawn and the following specifications substituted:

(1) Washed gravel for ballast shall be composed of hard, strong, and durable particles and shall conform to the requirements set forth in this specification.

(2) Washed gravel for ballast shall be graded from fine to coarse within the following limits:

Size of round screen	Size of corresponding sp. sieve	Percentages passing each size: 0% to 20% crushed, Minimum	0% to 20% crushed, Maximum	20% to 40% crushed, Minimum	20% to 40% crushed, Maximum	40% to 100% crushed, Minimum	40% to 100% crushed, Maximum
1½-in.	1¼-in.	98	100	98	100	98	100
1-in.	⅞-in.	65	100	50	100	45	95
½-in.	⅜-in.	45	70	30	65	20	35
¼-in.	No. 4	25	40	10	30	0	3
....	No. 10	0	3	0	3	..	..

In case of dispute the round openings shall govern; the square sieves are only approximately equivalent to the corresponding round screens.

Number 4 sieve shall have a clear opening of 0.187 in. plus or minus 3%.

Number 10 sieve shall have a clear opening of 0.09787 in. plus or minus 3%.

These sieves conform to the requirements of the Standard Specifications for Sieves for Testing Purposes of the American Society for Testing Materials.

The sample for determining the grading shall weigh not less than 50 lb. It shall be thoroughly dried at a temperature not greater than 230 deg. F. (110 deg. C.), weighed and passed through the screens given in the table. The screen analysis shall be calculated as total percentage by weight finer than each of the screens.

(3) Washed gravel for ballast shall not contain more than one-half of one per cent. of dust, dirt, or loam as determined by the following test method. The samples as received shall be moistened and thoroughly mixed. An accurately weighed sample of approximately 25 lb. shall be selected by quartering and dried to a constant weight at a temperature not greater than 230 deg. F. (110 deg. C.). The sample shall be thoroughly washed free of dust, dirt, or loam in a suitable container. After allowing to settle for about fifteen seconds, the dirty water shall be drained off, care being taken to prevent loss of fine sand. This operation shall be repeated with clean water until the wash water remains clear. After the final washing, the clean sample shall be dried to constant weight at a temperature the same as used in determining the initial weight, and then weighed. The difference in this weight and the initial weight, expressed as a percentage of the initial weight, shall be considered as the per cent of dust, dirt, or loam. If percentage as determined above is more than one-half of one per cent, the output of the plant shall be rejected until the faults have been corrected.

Inspection

(4) In case inspection develops the fact that the material which has been or is being loaded is not in accordance with these specifications, the inspector shall notify the manufacturer to stop further loading until the fault has been corrected, and to dispose of all defective material that has been loaded in cars, which shall be done at the expense of the contractor.

Measurements

(5) When ballast is being paid for by the ton, and it is impracticable to weigh each car, the weight per yard shall be obtained by weighing at frequent intervals not less than five cars loaded with ballast, the contents of which have been carefully measured. The weight per yard obtained by such a test shall be used in figuring the weight per car until another test is made.

(6) When ballast is paid for by the yard, the amount shall be determined by weighing each car, where practicable, and applying the weight per yard as determined by frequent tests. When impracticable to weigh each car, the contents of each car will be carefully estimated by comparison with cars, whose contents have been actually measured.

TABLE 1—DESCRIPTION OF SAMPLES OF GRAVEL BALLAST

Lot No.	Sources	Principal Mineral Constituent
67	Western Mississippi	Subangular chert and quartz
68	Southwestern Ohio	Rounded limestone and quartzite
70	Northeastern Illinois	Rounded limestone, diabase, quartzite and sandstone
71	Northeastern Illinois	Rounded limestone, chert, sandstone and quartzite
74	Western New York	Rounded granite, sandstone, gneiss and limestone
77	Northeast Central Texas	Flat limestone and sandstone
78	Central Louisiana	Subangular chert and sandstone
80	Northeastern Illinois	Subangular limestone, quartzite and chert
81	Northeastern Texas	Rounded chert and quartz
82	Southeastern Wisconsin	Rounded limestone and quartzite
98	Eastern Massachusetts	Subangular granite, sandstone, gneiss and schist
108	Southern Maine	Rounded trap, granite, quartz and sandstone
110*	Central Ohio	Rounded limestone
111*	Central Ohio	Rounded limestone
112*	Central Ohio	Rounded limestone
132	East Central Maryland	Rounded quartz

*Samples from same plant; only difference in percentage of crushed particles.

TABLE 2—MECHANICAL ANALYSES OF SAMPLES OF GRAVEL BALLAST

Lot No.	Source	Amounts coarser than each sieve—Per cent by weight: No. 4	⅜-in.	¾-in.	1-in.	1½-in.	2-in.	Per cent crushed particles	Weight per cu. ft. Loose	Rodded
67	Mississippi	81	74	44	14	1	0	34	118.3	126.6
68	Ohio	89	65	32	16	1	0	20	111.4	116.1
70	Illinois	100	99	64	23	0	0	73	91.2	100.7
71	Illinois	77	74	60	22	1	0	30	120.8	130.4
74	New York	99	98	76	42	0	0	49	94.9	104.8
77	Texas	56	54	38	15	2	0	26	125.0	130.6
78	Louisiana	85	64	21	5	0	0	34	108.3	113.5
80	Illinois	38	23	8	3	1	0	0	122.3	126.4
81	Texas	86	77	64	49	25	0	48	122.3	130.0
82	Wisconsin	82	74	43	20	4	0	44	119.5	127.4
98	Massachusetts	95	87	73	57	43	0	55	102.8	114.4
108	Maine	95	83	59	43	24	8	54	100.7	109.4
110*	Ohio	82	64	35	15	0	0	35	113.8	116.4
111*	Ohio	88	72	42	26	0	0	71	104.2	111.7
112*	Ohio	98	87	51	21	0	0	79	92.7	102.1
132	Maryland	(From laboratory stock)						....	....	....

*Samples from same plant; only difference in percentage of crushed particles.

TABLE 3—PHYSICAL TESTS OF SAMPLES OF GRAVEL BALLAST

(See text for descriptions of test methods)

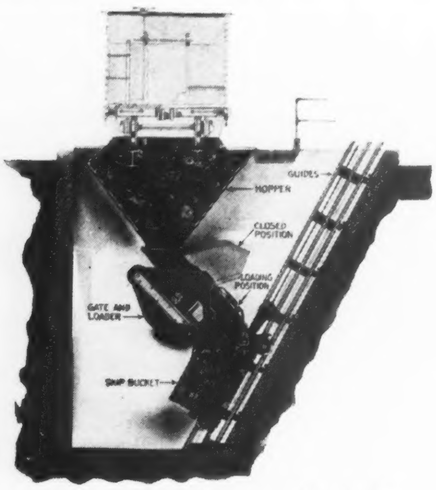
Lot No.	Source	Apparent specific gravity	Absorption, per cent by weight	Deval abrasion test, per cent by weight	Crushing test: Reduction in fineness, modulus†	Reduction in voids, per cent‡
67	Mississippi	2.46	1.75	2.0	1.30	37.2
68	Ohio	2.65	0.60	9.1	1.45	38.8
70	Illinois	2.59	1.56	4.3	......	......
71	Illinois	2.69	1.51	3.2	1.62	40.1
74	New York	2.63	0.88	2.4	1.08	36.1
77	Texas	2.62	0.78	7.3	2.00	45.5
78	Louisiana	2.59	0.30	2.7	......	......
80	Illinois	2.66	2.12	5.4	......	......
81	Texas	2.55	0.40	7.9	1.55	40.0
82	Wisconsin	2.72	0.94	1.8	1.16	35.0
98	Massachusetts	2.62	1.07	7.7	......	......
108	Maine	2.64	0.79	14.2	1.30	42.0
110*	Ohio	2.60	1.71	8.4	1.73	48.6
111*	Ohio	2.60	1.71	6.1	1.73	34.5
112*	Ohio	2.60	1.71	6.6	1.63	46.1
132	Maryland	2.61	0.68	8.7	1.36	41.4

*Samples from same plant; only difference in percentage of crushed particles.
†Difference in fineness modulus before and after test.
‡Difference in voids before and after test expressed as percentage of voids before test.

New Machinery and Equipment

New Automatic Loader for Skip Hoists

A NEW type of automatic loader for loading skip hoist buckets with sand, gravel, crushed stone, coal and other materials, has been added to the Link-Belt Co.'s line of such equipment. The new loader, here illustrated, has a simple attachment, which consists of a swinging plate so arranged that unless material is flowing through the chute in sufficient depth to maintain electrical contact, the skip hoist will not operate.



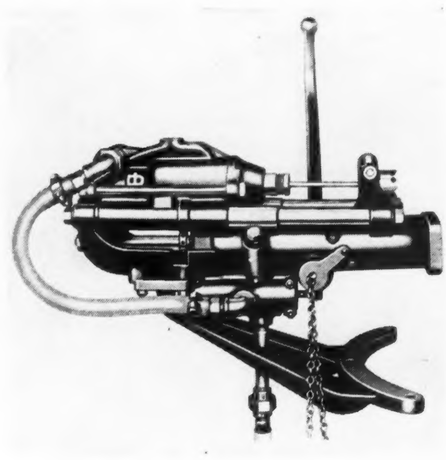
Automatic loader for skip hoists

When the bucket reaches the loading position the loader permits the material to flow from the hopper until the bucket is full, when the mechanism instantly causes the bucket to be hoisted, thereby moving the loader into its closed position, where it remains as the bucket continues to travel to the emptying point, and until bucket returns to the loading position, where it is again automatically loaded. The bucket continues to load and empty automatically so long as there is sufficient material to fill it.

New Shank and Bit Punch

INGERSOLL-RAND CO., New York City, announces a new shank and bit punch known as the 34SP punch, designed to fit its No. 34 drill steel sharpener. The feed cylinder, valve chest oiler, and guide holder are constructed in one piece, and the valve chest is brushed. Operations are speeded up, it is said, by the short throw and easy reach of the operating lever. Complete lubrication is maintained from one oil chamber.

Stuck pins are claimed to be eliminated by the positive action, which drives the punching pin out of, as well as into, the steel which is held clamped in the sharpener during the operation, the manufacturers state. Combination shank and bit guides permit handling both bits and shanks on any one steel section without changing guides and assure the correct alignment of steel to be punched, it is said.



New shank and bit punch

The outfit will handle any section of drill steel up to 1⅛ in. in dia., and will make bits up to 2½ in. in dia.

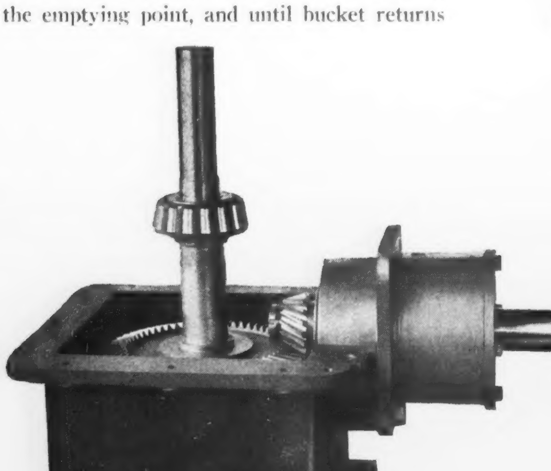
Spiral Bevel Gear Right Angle Speed Reducer

A NEW type right angle speed reducer consisting of spiral bevel gears mounted on Timken roller bearings is announced by the D. O. James Manufacturing Co., Chicago, Ill. This new line includes both horizontal and vertical types with slow speed shaft extended either upward or downward.

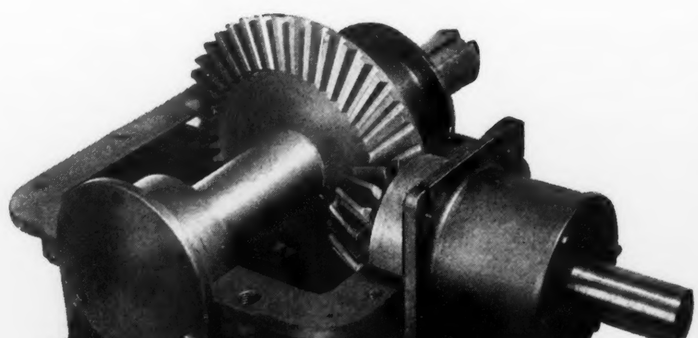
Ratings range from ¼-hp. to 100-hp., with ratios 1:1 to 6:1. Larger reductions are obtained by the combination of the spiral bevel gear and planetary spur gears with ratios 8:1 to 1600:1 or more. The gear teeth and bearings are lubricated by means of the splash system.

One Hundred Years of Development in Wagon, Truck and Railway Scales

IT was in 1815 that Major Joseph Fairbanks moved from Brimfield, Mass., to St. Johnsbury, Vermont, and set up a grist mill and saw mill on the banks of a little creek that ran through this old Vermont town. His sons, Erastus and Thaddeus had even broader visions and established a wheelwright and foundry



Vertical type, new right angle spiral bevel gear speed reducer



Spiral bevel gear speed reducer, horizontal type

business and then developed into manufacturing saws, pitchforks, cast iron plows and stoves; in about the year 1830 the "hemp craze" as it was called, struck Vermont and the farmers expected to make substantial fortunes in raising hemp instead of corn. Contracts for making hemp dressing machines were awarded to the Fairbanks Brothers. The question now arose—How was the hemp to be weighed? The old steelyard was of little use for this service and so Thaddeus conceived the idea of constructing a huge steelyard beam suspended from a high frame with chains to grapple the axle of the cart. An approximate weight was thereby obtained by a slow and laborious process.

Thaddeus studied the problem and finally conceived the idea of supporting the platform upon an A shaped lever with the tip of the lever connected to the steelyard by a rod. Though not suspected by Thaddeus at the time, he had revolutionized all weighing methods and at that moment the steelyard of old Rome took its departure.

From this small beginning the platform scale in all of its ramifications was developed until today the same principle is in use whether in a health scale, a laundry scale or the ponderous ones used for weighing the largest railway locomotives.

The design of the "straight lever" railroad track scale is almost a century old. With one exception all such scales today have been copied from the general arrangement of this scale. Naturally they have been strengthened and improved to keep pace with modern traffic conditions, but the principle remains the same.

The United States patent for the railroad track scale was granted Thaddeus Fairbanks, on January 13, 1857, he being the first to introduce these scales into the United States. Track scales have been continuously manufactured at the St. Johnsbury plant for nearly 75 years and the leading railroads in the United States, as well as in many foreign countries have adopted them as standard. They have so accurately adjusted that a scale loaded with 150 tons will readily indicate an addition of 10 lb. on the platform.

Brought out in 1900 the type registering beams were an advanced mechanical product that met with a ready sale and are still extensively used in elevators, rolling mills, refineries, steel plants, railroads, etc. The beam is of the usual pattern but in addition to this the under edge of the beam is provided with a series of type figures corresponding with the weight in graduations. The poise is provided with an internal mechanism so that when the load has been balanced upon the scale by the usual process, a ticket is inserted in the slot of the poise and by means of the handle an impression is made, giving the weight of the load.

In 1913-14 the plate fulcrum principle in scale construction was applied to railway track scales. This idea had been developed in 1875 and was then patented for use on large capacity scales; it was first used by the inventor, A. H. Emery, in that year on steel testing machines built for the bureau of standards. The principle was given considerable study by Fairbanks engineers with the result that it was finally adopted for track scale installations.

With the advent of the automobile truck which slowly but quite as surely began to displace the horse drawn wagon and truck, the old type wagon platform scale became inadequate and there was introduced a sturdier weighing machine known as the type S auto truck scale which found ready acceptance.

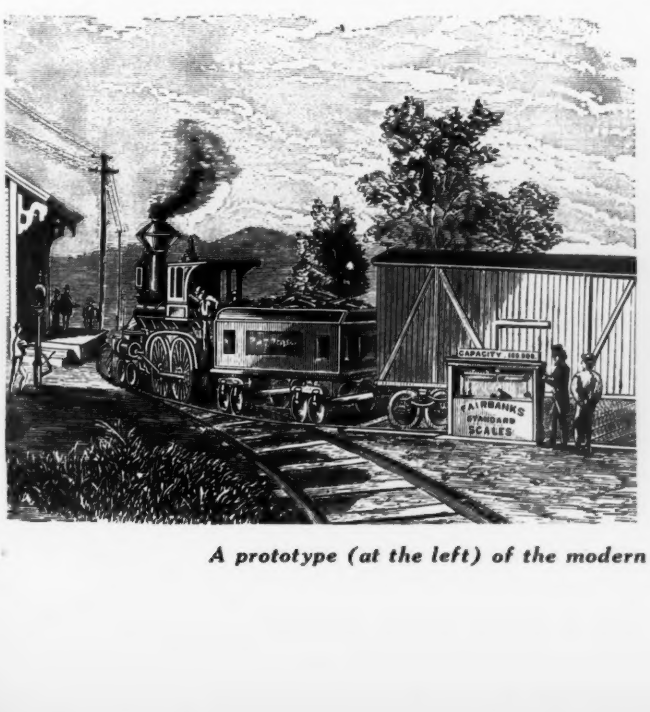
Self-indicating or dial machines have been the most recent development in scale making and the St. Johnsbury factory now makes them in capacities from 50- to 40,000-lb. Leonardo de Vinci who lived in the fifteenth century, is credited with inventing these scales, drawing of them in his note books having been preserved. The pendulum mechanism has proven much more accurate and serviceable than the springs that were once used, while the double pendulum gives the most accurate results. Dial scales and automatic weighing eliminate to a great extent the human element and it may be safely predicted that there will be a great extension of this device.

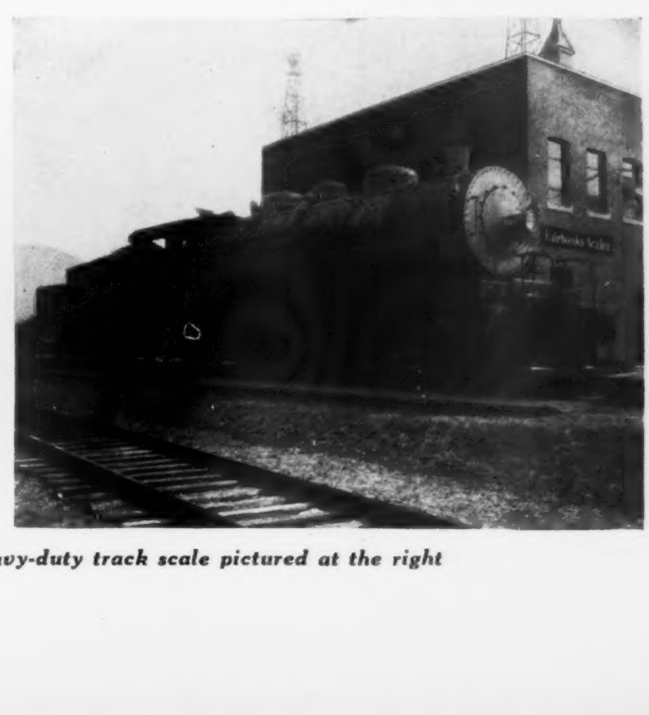
The world's largest scale was built recently at the St. Johnsbury factory and is located at the plant of the Hamilton Furnace Co. at Hamilton, Ohio. The Hamilton foundry had installed a movable mixer built on railroad trucks and the Fairbanks scale weighs the entire load, the car and its contents. The loaded mixer weighs a million pounds, six times the weight of a loaded coal car. The new scale is an exact duplicate of other scales except for its large proportions, being a regular Fairbanks two section railroad track scale. Though simple in construction its accuracy is guaranteed to within 20 lb., 0.002% of full scale.

As America's industries have become specialized so too have scales been designed to meet the particular needs of each industry. The in-built accuracy of the modern scale must be matched with an in-built ability to retain that accuracy under special conditions of operation. Scales are now built in an almost endless variety to meet these present day requirements of speed and accuracy.

New Laboratory Oven

THE Freas-Thermo Electric Co., Irvington, N. J., has recently developed a new series of controlled-heat, electric, laboratory ovens, with horizontal-flow forced-air circulation. The heat transfer is by mechanical air movement in the design which permits the use of shelves and trays without obstructing its air circulation, it is stated.





A prototype (at the left) of the modern heavy-duty track scale pictured at the right

News of All the Industry

Incorporations

Diamond Sand and Gravel Co., 750 Gaylord St., Denver, Colo., dissolved.

Medina Sandstone Corp., Albion, N. Y., 200 shares common. To operate quarries.

Bushnell Basin Sand and Gravel Corp., Rochester, N. Y., $50,000. R. T. Gallagher, Rochester.

Santa Clara Sand Co., Santa Clara, N. Y., 750 to 1000 shares, no par value.

Port Arthur Building Material Co., Port Arthur, Tex., $50,000. B. S. Woodhead, J. T. Woodhead and G. D. Anderson.

Sybolt Sand and Gravel Corp., Marion, Ind., 1000 shares no par value. Frank Sybolt, Edna Howe and Willard Howe.

Midatlantic Sand and Gravel Corp., Norfolk, Va., 1000 shares no par value. E. J. Doran and John Twehy of Norfolk.

Nashville Ready-Mixed Concrete and Supply Co., Fourth and First Bank Bldg., Nashville, Tenn., $50,000. M. F. Sills.

Morris County Sand and Gravel Co., Bloomfield, N. J., $250,000 preferred and 25,000 shares common stock.

Indianapolis Concrete Products Co., Indianapolis, Ind., reported as having filed certificate evidencing preliminary dissolution.

Concrete Slab Corp., Richmond Hill, N. Y., $25,000 preferred stock and 1000 shares common. J. P. Slensby.

Lithgo Sand, Gravel and Construction Corp., Poughkeepsie, N. Y., $50,000. P. A. Reiser, Poughkeepsie.

L. M. Concrete Corp., New York City, $10,000. C. W. Nammack, 15 William St., Manhattan, New York City.

Beckley Marble Co., Beckley, W. Va., $5000. W. L. Foster, Lacy Trump, Ward Cook, A. S. Evans and S. Ginesstra, all of Beckley.

Michigan City Core Sand Corp., Michigan City, Ind., 2000 shares of no par value. Carter H. Manny, Howard H. Spaulding and Guy P. Knickerbocker.

E. L. Ramm Co., 223-241 Tilden Ave., La Grange, Ill., $60,000. To deal in concrete products. Edward L. Ramm, Clarence H. Ramm and Harry C. Ramm.

McLean Stone Co., Kingston Springs, Tenn., $300,000 and 12,000 shares no par value stock. Ralph E. McLean, Morris E. McLean and J. G. Stephenson.

Transit Concrete Co., 253 River Drive, Passaic, N. J., 2500 shares no par value stock. Amos N. Prescott, Ralph D. Prescott and Arthur J. Messineo.

Long Stone Co., Columbus, Ohio, $20,000; to issue 500 shares, par value $50 each. To operate stone quarries in Ohio. V. Heil, Amos Long and L. V. Balmer.

Seneca Caverns Co., Riverton, W. Va., $100,000 (10,000 shares, par value $10 each). To deal in lime products. U. S. Harman, Wm. C. Harman, Robert A. Loar, Verd A. Hinkle and Walter S. Amos.

Edward W. Schaefer and Sons, Inc., Indianapolis, Ind., 1000 shares no par value. To deal in granite, marble, slate, stone, cement, etc. Edward W. Schaefer, Ralph L. Schaefer, Harold E. Schaefer and Dorothy E. Schaefer.

Quarries

J. E. Baker Co.'s quarry at Williamson, Penn., has been leased by Harry T. Goetz of Center Square, Penn.

D. M. Deen, Harlan, Iowa, who operated a marble quarry at Harlan, Iowa, has purchased an interest in the New England Granite Plant at Marshalltown, Iowa, and will locate there.

Briar Hill Stone Co., Millersburg, Ohio, is completing enlargement of its offices. An additional floor has been added to the former one-story office building, making the second time during the past few years that expansion of the company's business has necessitated additions to its office facilities.

Indiana Limestone Co., Bedford, Ind., announces the election of B. M. Pettit as vice-president. Other officers were re-elected. The first quarter of the present fiscal year will be the best in the history of the company, according to Frank S. Whiting, treasurer.

Greer Limestone Co., Greer, W. Va., has completed a number of improvements at its limestone mine and crushing plant. The mine, opened to permit operations during bad weather, has been extended back into the mountain for about 300 ft. and is 50 ft. high and 50 ft. wide. A new electric shovel with 1¾-cu. yd. dipper has been purchased for use inside the mine. Among other equipment, a vibrating screen has been installed in the crushing plant.

Cement

North American Cement Corp. has resumed operations at its Security, Md., plant following improvements which included the installation of a new hammer mill.

Pennsylvania-Dixie Cement Corp. has started stripping operations at its quarry near Gilmore, Iowa, preparatory to excavating rock for the Penn.-Dixie cement mill at Valley Junction. The quarry will be operated the year around, according to present plans.

Michigan State Cement Plant, Chelsea, Mich., will suspend operations for two months, according to Mathew H. McGaffigan, superintendent. Storage facilities are utilized to capacity and production has been curtailed until shipments are made. Repairs will be made during the shutdown.

Utah-Idaho Cement Co., Ogden, Utah, has elected the following officers: Chapin A. Day, president and director; Harold C. Day, vice-president and director; Ralph E. Bristol, secretary, director and treasurer, and C. R. Hollingsworth, assistant secretary and assistant treasurer.

Ideal Cement Co., Denver, Colo., has been successful in the drilling of natural gas wells in the Ada, Okla., district, where it has one of its cement mills. The Ada plant has been using natural gas bought from outside sources, but now the Ideal will constsuct a ten-mile pipe line, use its own gas and bring about a great saving in production costs. The company now has developed 100,000,000 cu. ft. of gas a day.

Sand and Gravel

Columbus Gravel Co., Columbus, Miss., has re-elected all officers for the current year. C. G. Kershaw, Birmingham, Ala., is president and C. F. Harris, Columbus, Miss., is general manager.

Consumers Co., Chicago, Ill., at its recent stockholders' meeting elected C. J. O'Laughlin, J. J. O'Laughlin and Joseph Hock as directors in addition to the 15 members re-elected to the board.

Chillicothe Sand and Gravel Co., Chillicothe, Ohio, has applied to the city council for permission to construct a spur railroad track from the N. & W. railroad tracks to its pits.

Bagnell, Mo. Work on the sand and gravel plant being constructed here is making good progress. Most of the machinery has already been delivered and the plant will soon be in operation.

J. K. Davison and Bro., Pittsburgh, Penn., has started the season's digging in the Allegheny river. The electric sand dredge of the company commenced operations at Nine Mile Island recently.

Columbus Gravel Co., Columbus, Ohio, at its recent meeting elected the following officers: R. H. Routt was made president and general manager; O. P. Rhoades, secretary-treasurer, and M. Miller, general superintendent. The plant of the company is now being remodeled and enlarged.

The Arkadelphia Sand and Gravel Co., Arkadelphia, Ark., is to operate night and day shifts. According to Clarence Hawkins, manager of the plant, the two shifts have been made necessary by the increasing demand for material for highway construction.

West Penn Sand and Gravel Co., which operates a plant at Rochester, Penn., on the Ohio river, has awarded contract to the Midland Barge Co. for the construction of four steel sand and gravel barges of the deck type. The barges will be each 100 ft. long, 26 ft. wide, 6.6 feet deep, and will have a capacity of 375 tons each.

Parker Gravel Co., Monroe, La., which is operating several pits in northern Louisiana, has started construction of a spur track three miles long, from the Missouri Pacific railroad line at Sterlington to a new gravel pit on the property of Will Steele. The company has a contract with the railroad to furnish a large amount of gravel to be used for roadbed.

Missouri Gravel Co.'s new $100,000 plant on the state tract near La Grange, Mo., which has been under construction for the past several months, is now in operation. The plant has a capacity of from 60 to 70 carloads daily and will produce five different sizes of gravel. The company will continue its river plant and expects to ship a total of 8000 carloads of sand and gravel this year. Moline Consumers Co., Moline, Ill., owned by the same interests as the Missouri Gravel Co., recently acquired 268 acres here, adjoining the state-owned tract, and purchased the equipment of F. T. Odell, who for the past three years has been excavating from the tract for the state highway commission.

Lime

Washington Brick, Lime and Sewer Pipe Co., and **John L. Wick**, building material dealer, will move their Seattle offices from the Seaboard Bldg. to 1723 Westlake Ave. N., Seattle, Wash. Wick and the Washington concern have taken a long lease on the ground floor of the P. J. McHugh Bldg. and will spend several thousand dollars in remodeling the space to suit their needs, including ample space for the storage of materials. The main office of the Washington company is at Spokane.

Cement Products

Standard Cast Stone Corp., Harrisonburg, Va., is to erect an addition, 32x60 ft., to its cement products plant. M. L. Lay is manager of the plant.

Oklahoma Cement Pipe Co., Tulsa, Okla., is to erect a plant on a site adjoining Crowell Heights Addition south of 11th St. A sectional steel warehouse, 60x200 ft., and large steel storage bins for storing stone and sand will also be constructed. J. M. Chandler is president of the company.

Ornamental Stone Co., Minneapolis, Minn., will transfer its plant to Sioux City, Iowa, where it will occupy 10,000 sq. ft. of space at 500 West Fifth St. Products of the company will be marketed under the trade name of "Stonite." George B. Lee, Minneapolis, is president and sales manager, and E. A. Arndt, Sioux City, is vice-president.

Nichols Concrete Block Co., Dayton, Ohio, whose plant is located on the Wolf Creek pike, is expanding. Machinery has been added and the capacity of the plant increased to 5000 concrete building blocks per day. New drying rooms of special design enable the company to speed up production and turn out a more seasoned block of greater durability. Overhead bins have also been added during the past year.

Miscellaneous Rock Products

Atomite Corp.'s Lower Bridge diatomite mill at Bend, Ore., was destroyed by fire of unknown origin recently with a loss of $65,000.

Texas Potash Corp. is reported to be expending approximately $2,500,000 in sinking shafts and the construction of a processing plant at Midland, Tex., to refine polyhalite, potash mineral. Homer R. Mitchel is president and M. Agress, vice-president, both at 2424 South Blvd., Dallas, Tex.

Personals

W. J. Welp, Humboldt, Iowa, has become identified with the Humboldt Gravel and Tile Co., Humboldt, Iowa, in which he recently acquired an interest.

Edward F. Fisher of Detroit has been elected a director of Baldwin Locomotive Works, Philadelphia, Penn., to fill the vacancy caused by the death of John M. Hansen of Pittsburgh.

Albert E. Frosch, secretary-treasurer and general manager of the Eastern Ohio Sand and Supply Co., East Liverpool, Ohio, has been chosen as a director of the Ohio Valley Sand and Gravel Producers Association.

Howard A. Loeb has been elected a director of the Warner Co., Philadelphia, Penn., to succeed George de B. Keim, resigned. Mr. Loeb is chairman of the Tradesmen's National Bank and Trust Co., Philadelphia.

Sam Freisner is the new manager of the North Baltimore quarry of the France Stone Co., Toledo, Ohio. He succeeds Ralph W. Freisner, his brother, who was transferred several months ago to the superintendency of the Toledo slag plant.

Stanton Walker, director of engineering and research for the National Sand and Gravel Association of Washington, gave an address before the Concrete division of the Cleveland Engineering Society on "The Effect of Aggregate Characteristics on Quality of Concrete."

E. R. Norris has been appointed assistant to the vice-president of the Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penn. Mr. Norris, formerly general works manager, will now be responsible for all plant facilities of the company, manufacturing methods, cost reduction and inspection.

M. C. Steffen has been made manager of the Cincinnati office of Cutler-Hammer, Inc., with headquarters at Milwaukee, Wis. Mr. Steffen comes to Cincinnati from the St. Louis office of Cutler-Hammer, where he has been stationed the last five years. He takes the place of R. I. Maujer, who has resigned.

D. A. Fleischman, formerly with the Bates Valve Bag Corp. and more recently with Taggart Brothers Co., has been named district manager in charge of the latter company's Pacific Coast offices, succeeding W. S. Weaver, resigned. Mr. Weaver, who has been in charge of the Bates company's Pacific Coast offices for the past 10 years, will take a similar position with another concern.

Obituaries

Jens Moller, pioneer cement manufacturer at Cement City, Tex., died recently at his home in Wichita Falls, Tex.

Francis Cottle Willard, age 58, general manager of the Willard Sand and Gravel Co., Farmingdale, L. I., passed away suddenly recently while at his desk. Mr. Willard organized the sand and gravel company in 1917 and it expanded widely under his management.

Gilbert Cooper, age 45, former head of the Ideal Concrete Co., was found dead in the Krause quarry on February 21. A coroner's jury returned verdict of death due to drowning. Mr. Cooper founded the Ideal Concrete Co. 19 years ago and held controlling interest until a few weeks ago, when he relinquished his position to John Sengenberger.

Manufacturers

Hendrick Manufacturing Co., Carbondale, Penn., announces the removal of its Pittsburgh office from 981-B Union Trust Bldg. to 1846 Koppers Bldg., Pittsburgh, Penn.

Baldwin Locomotive Co., Philadelphia, Penn., at its annual meeting re-elected all directors and approved the proposal to increase the indebtedness of the company to a maximum of $15,000,000 in addition to the outstanding funded debt.

Combustion Engineering Corp., New York City, announces the removal of its Hazleton, Penn., representative, the Coxe Stoker Engineering Co., to new quarters at Rooms 1109-1114 Markle Bank Bldg.

Gardner-Denver Co., Denver, Colo., during the first two weeks of March received orders totaling $140,000, giving indication that March sales will be substantially above those of January or February.

Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has received contract from the Anglo-Chilean Consolidated Nitrate Corp. covering two 60-in. all-steel Superior type gyratory crushers, which will be shipped to Chile.

H. K. Ferguson Co., Cleveland, Ohio, has taken over the DeVore Co. of Toledo, specialists in the design and layout of glass factories and paper mills. H. C. Van Tine, president of the DeVore Co., will join H. K. Ferguson Co. as contract and consulting engineer.

Morrison Railway Supply Corp., Buffalo, N. Y., has purchased the rails in track formerly operated by the Jamestown and Warren Street Railway Co., running from Jamestown, N. Y., to North Warren, Penn., a distance of approximately 25 miles of 70-lb. ASCE section rail. The company will start dismantling of tracks immediately.

Goodyear Tire and Rubber Co., Akron, Ohio, has signed a contract with the Liquid Carbonic Co. for the use of a new patented process of that company which matures rubber by the use of carbonic acid gas. This new process, it is claimed, will result in a saving of time equivalent to 40% in the maturing of rubber.

Broderick and Bascom Rope Co., St. Louis, Mo., recently took possession of its new office and warehouse building, adjoining the St. Louis factory. Executive offices and the general office occupy the entire second floor of the new building, while the ground floor is given over to the tramway department and the storage of finished rope.

Sivyer Steel Casting Co., Milwaukee, Wis., recently consolidated with the Nugent Steel Castings Co. of Chicago, elected the following officers at its recent stockholders' meeting: C. R. Messinger, chairman of the board; L. S. Peregoy, president; M. A. Fladoes, vice-president in charge of sales; George L. Pollock, secretary, and C. A. MacDonald, treasurer.

Anchor Concrete Machinery Co., Columbus, Ohio, has entered into an agreement with the Consolidated Concrete Machinery Corp. of Adrian, Mich., to take over its Columbus, Ohio, office and handle its line of concrete machinery in western Pennsylvania, western New York, Virginia, West Virginia, Maryland, District of Columbia, and Ohio. The company will handle not only the machinery manufactured by the Consolidated Concrete Machinery Corp., but will also furnish concrete products plants complete throughout, as in the past.

A. M. Byers Co., Pittsburgh, Penn., announces the following additions to its sales organization: D. S. Sampson, assigned to the New York office under division manager G. W. Hamill, to cover New Jersey territory. R. C. Hamlett, assigned to New Orleans under jurisdiction of division manager A. D. Sheers of Atlanta. Irwin P. Young, with headquarters at Chicago, under division manager M. G. Henderson. T. D. Graham, assigned to St. Louis territory under Chicago division manager M. G. Henderson.

Trade Literature

NOTICE—Any publication mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of the items kindly mention ROCK PRODUCTS.

Wire Rope. The February issue of "The Yellow Strand" contains an interesting article on "Stresses and Strains" as related to wire rope. BRODERICK AND BASCOM ROPE CO., St. Louis, Mo.

Grinding and Pulverizing. Bulletin **No. 13B** on conical ball and pebble mills and their application to the field of grinding and pulverizing. HARDINGE CO., York, Penn.

Steam Shovels. Attractive folder on steam shovels, telling of the experience and plant facilities of the MARION STEAM SHOVEL CO., Marion, Ohio.

Sand-Lime Brick. Catalog **No. 3003** on the manufacture of sand-lime brick, covering such machinery as rotary presses, mixing pans, rod mills, cars and accessories and hardening cylinders. W. A. RIDDELL CO., Bucyrus, Ohio.

Skip Hoists. Exceptionally well illustrated booklet, **No. 946**, on skip hoists for handling large and coarsely broken material and for all capacities from the smallest to the largest. Full details and specifications. LINK-BELT CO., Chicago, Ill.

Used Equipment. Bulletin **No. 403**, containing list of available equipment, such as boilers, buckets, various types of cars, compressors, cranes, engines, generators, hoists, etc. WALTER A. ZELNICKER SUPPLY CO., St. Louis, Mo.

Shovels. A comprehensive little booklet, entitled "The Right Arm of Progress," dealing with the history of the shovel and various types in use at this time. BUCYRUS-ERIE CO., South Milwaukee, Wis.

Alloys. "Properties of Haynes Stellite" is the title of an exceptionally well illustrated book covering a general description of Haynes Stellite alloys, an explanation of red hardness, the uses, physical properties, chemical properties and structure of these alloys. HAYNES STELLITE CO., Kokomo, Ind.

Crushers. Thirty-two-page booklet on crushers. Each type of crusher illustrated in good size, and specifications of the various machines in the group are given. The booklet contains illustrations of parts, sectional diagrams and complete tabular matter. EARLE C. BACON, INC., 26 Cortlandt St., New York City.

Construction. Convincing evidence of the work of the Morton C. Tuttle Co., engineers and managers of construction, is given in a new folder just issued showing the clients served during the past year, and illustrated with examples of the work accomplished. MORTON C. TUTTLE CO., Boston, Mass.

Sinker Drills. New edition of Bulletin **850** giving details of design and construction of CP line of sinker drills for use wherever it is desired to drill holes rapidly and economically in rock, concrete, gypsum, etc. Several sizes and weights. CHICAGO PNEUMATIC TOOL CO., New York City.

Permissible Explosives. A new and generously illustrated pamphlet on "Permissible Explosives" compresses into the space of 40 pages a great deal of valuable information concerning the characteristics of modern permissibles and the methods of using them to the best advantage. E. I. DU PONT DE NEMOURS AND CO., INC., Wilmington, Del.

Crushing Equipment. Illustrated bulletins on various types of rock crushers, elevating, conveying, feeding, screening, washing, transmission and other equipment used in the production of crushed rock and sand and gravel have been bound together in one volume for handy reference. THE GOOD ROADS MACHINERY CO., INC., Kennett Square, Penn.

Welding Rod. Circular **No. A-43**, listing complete line of Weldite welding rod. Over forty distinctly different rods to cover every phase of welding have been conveniently grouped in this circular to facilitate the user in selecting the best rod for his particular application. General information such as standard rod sizes and lengths, packing and other details are also included. FUSION WELDING CORP., Chicago, Ill.

Indicating and Recording Instruments. Catalog **No. 7501** on "Remote Control Instruments" for furnishing needed data instantly and accurately from distances of a few hundred feet up to 30 miles; in models respectively designed to control, record and indicate flows, pressures, liquid levels and positions. Catalog **No. 21** on electric flow meters, discussing the use of these instruments in modern industrial processes and showing eight types of flow meters available. THE BROWN INSTRUMENT CO., Philadelphia, Penn.

Labor Saving Equipment

STEPHENS-Adamson Mfg. Co., Aurora, Ill., has issued its latest catalog, No. 30, containing complete information regarding dimensions, weights and engineering data on the line of labor saving machinery manufactured that will assist the engineer, owners and plant manager in the selection of proper machinery for a specific use. The book contains 951 pages and is profusely illustrated with drawings, illustrations, etc., and carefully indexed.

In addition to the general catalog, the company has special catalogs and bulletins covering labor saving machinery for the rock products and other industries.

New Ready-Mixed Concrete Unit Developed

A NEW building material, described as a "concrete veneer unit" and designed to simulate brick when erected has been invented by two Hattiesburg, Miss., men, William F. Ramey and his son, D. B. Ramey.

According to the report, the wooden forms are built, concrete mixed and poured, and the blocks cured and set right on the ground where construction is being done. The units range from sections of one to six bricks in size for straight wall work, while corners, sills, and beautiful designs for ornamenting chimneys, outside flues and doorways can be made. The material also can be moulded in any desired color.

National Concrete Burial Vault Association Formed

THE National Concrete Burial Vault Association has been formed at Columbus, Ohio. This association is an outgrowth of what was formerly the Ohio association. Memberships are held by manufacturers in 12 states and a program providing for standard specifications, advertising and marketing is to be instituted. J. H. Stuart of Bremen, Ohio, is secretary-treasurer.